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FEATURES

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On the cover . . . A Rock Island Armory .22 TCM with a 3-9x 40mm scope.

COLUMNS

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Skeeter and the .44 Smith & Wesson Special

RELOADER'S PRESS by Dave Scovill

The Smith & Wesson Second Model .44 Target was the first mass-produced N-frame revolver with a heat-treated cylinder.

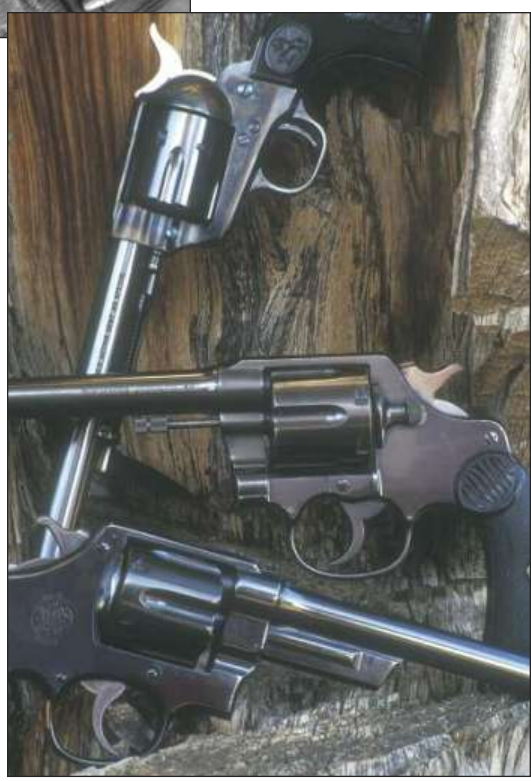
Roberta and I were walking through an older section of Philadelphia with Sally Jim Skelton, the wife of the late gun writer Charles "Skeeter" Skelton, admiring the wares in shops bordering the cobblestone courtyard that resembled a botanical garden. Skeeter died on January 17, 1988, but Roberta and I had the pleasure of editing Sally Jim's book *I Remember Skeeter*, a compilation of essays written by friends and associates and a selection of his delightful stories.

Somewhere along in the conversation, I remarked, "If it hadn't been for Skeeter, I probably wouldn't be in this business." Sally Jim responded, "If I had known that, I would have asked you to write something." I assured her that there were plenty of opportunities to tell her that while we worked on her book, but it seemed inappropriate at the time.

Charles "Skeeter" Skelton, a product of the Dust Bowl era, had been a U.S. Marine, lawman, politician and part-time cattleman when he opted to venture into the gun writing business in the late 1950s, where his feature stories and column eventually came to the pages of *Shooting Times* (ST). By any reasonable measure, Skelton was a instant success, sharing his background and experiences with handguns, along with stories of real and fictional characters.

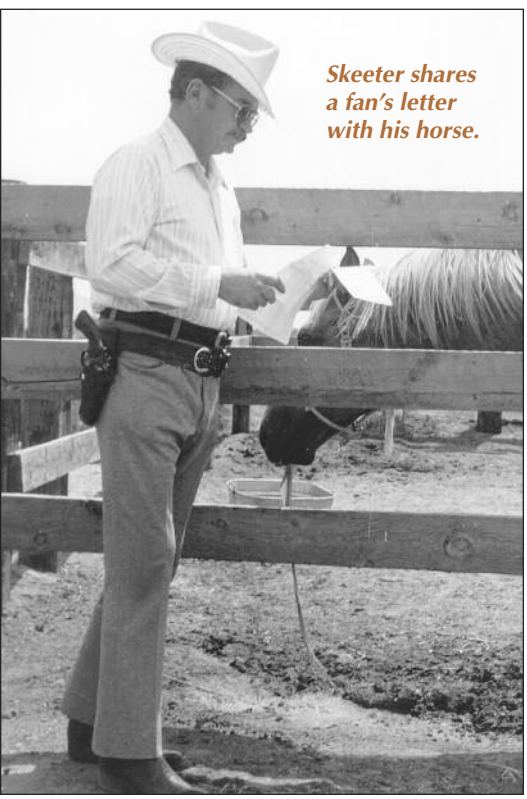
In the early 1970s, having been recently released from active duty with the U.S. Navy, I discovered ST on a newsstand. A column or feature written by Skelton struck me as a few steps above the run-of-the-mill gun writer of the period; he was a master storyteller with credibility that can only be acquired over a lifetime of experience with handguns.

In those days I owned two handguns, a Colt SAA .38 Special (According to the factory letter, it was originally shipped to El Paso, Texas, as a .41 Colt in 1908.) that was eventually converted to .45 Colt and a Navy Arms .44-caliber cap-and-ball black-powder sixgun. The U.S. Navy had been kind enough to loan me two of its Colt 1911 .45 ACP handguns and all the ammunition I could shoot for a couple of years, but that was it in terms of



Three of the finest handguns ever made were chambered for the .44 Special, including (top to bottom): the Colt Single Action Army, Colt New Service and Smith & Wesson New Century (Triple Lock).

hands-on experience with centerfire handguns. When Skelton wrote an essay about creating a .44 S&W Special from a bored-out and rebarreled S&W Model 27, and later, a Ruger Old Model flattop .357 Magnum that was also converted to .44 Special, I was hooked and began what turned out to be a lengthy, exasperating and ultimately quite expensive search for a .44 Special.



Skeeter shares a fan's letter with his horse.

At the time, Smith & Wesson was using all of its big N-frames to produce .357, .41 and .44 Magnums and an occasional run of .45 Colts and .45 ACPs, while Colt was busy selling double actions, 1911s and occasional runs of SAAs, pitifully few of which were .44 Specials. Ruger sold all the Super Blackhawk .44 Magnums it could make, and since those big SAs would also fire the .44 Special, there was no logic – according to Bill Ruger – in building a downsized .44. So, in spite of lobbying efforts by Skelton and others to the "Big Three," chances for a regular lineup of .44 Specials were slim to none.

Working for a West Coast retail outfit, I was managing a store in downtown Everett, Washington, in 1975. There was a pawn shop around the corner from my store where I befriended the owner and dropped a few hints about the quest for a .44 Special. The pawn broker eventually called to tell me about a fine post-World War II Colt SAA .44 Special with a 7.5-inch barrel. The asking price seemed reasonable, so we made a deal. Sometime later he called again, blurting out that a lady just walked in and laid a Smith & Wesson .44 Target Model on the counter, wanting to sell it. He went on to say it was her late husband's, the sheriff of Snohomish County, Washington. She didn't like guns and wanted to get rid of it. Within minutes the contents of the checking account was purged, again.

Stocking up on reloading supplies for the .44 Special put another dent in the finances, and along with the .45 Colt, those revolvers became the basis for what would, unwittingly, become a lifetime of

research and load development with cast bullets and hunting with handguns.

Upon leaving the retail business in 1984 and becoming a single parent with two children (Jason, age 6 and Alicia, age 5), owing the untimely passing of their mother, our abbreviated family settled into a old house in Klamath Falls, Oregon, and I sat down with a typewriter and/or bullet casting equipment after walking the kids to school. The kids went along on my short excursions into forest lands to test handloads that were put up during the week, where they played out imaginary adventures and fashioned a teepee out of limbs and pine needles.

In time, the collection of handload data for the .45 Colt, and .38 and .44 Specials, became extensive enough that it might amount to sufficient material for one or more feature stories. By then it was pretty obvious that the industry didn't need another writer who parroted other folks, so I concentrated on ideas that most writers shied away from, apparently due to time and effort involved, and the constant challenge of meeting deadlines.

A .45 Colt story was ultimately sent to *Handloader* magazine, where it languished in a file for a couple of years, fairly typical for freelance material at the time, and I turned to pieces on mule deer and bighorn sheep management using information and research done by all the western states that had mule deer and bighorn populations. Both sold almost immediately. Shortly thereafter, Wolfe Publishing forwarded a check for the .45 Colt piece, which led to a couple of *Rifle* features, and in due course, at the behest of the then-editor Al Miller, a staff job as handgun and cast bullet editor for *Handloader*.

About the time I realized that it would be easy to go broke while attempting to become a freelance writer, fate stepped in when Al Miller asked if I would consider the editor position at Wolfe. The

house was rented out to a local friend, and we packed up the essentials, moving to Prescott, Arizona, in March 1989.

Nowadays, there is a representative selection of Smith & Wesson, Ruger and Colt .44 S&W Specials on hand, including an Old Model Ruger .357 that was converted to .44 Special by Doug Turnbull and Hamilton Bowen. The first SAA .45 Colt digested so many cast bullet loads that the forcing cone resembled burnt asphalt, and the finish was worn to bare metal; the second barrel nearly suffered the same fate.

Sometime in the mid-1970s, I sent a photo of the S&W Second Model .44 Target to Skelton at ST with a question about production numbers. The letter and photo were published in ST a short time later, with an answer explaining that neither Skelton nor Roy Jinx, the S&W historian, knew for sure, but offered a guess of a dozen or two. Acknowledging the rarity and the all too real chance that I might wear it out as well, it was sold to a collector. The Colt SAA .44 Special was sold to an airline pilot in the early 1980s. Both .44s remind me of an article Skelton wrote

(Continued on page 67)

Right, lobbying by Skeeter Skelton and others eventually resulted in special runs of .44 Specials, like this New Frontier .44 WCF with an additional .44 Special cylinder.

Left, this custom Old Model Ruger Blackhawk was converted to .44 Special by Doug Turnbull and Hamilton Bowen.

6.5 Creedmoor

BULLETS & BRASS by Brian Pearce

Q: A couple of months ago, I purchased a Ruger M77 Hawkeye stainless 6.5 Creedmoor. It shoots extremely well with factory loads (120- and 123-grain bullets), with five-shot groups almost always measuring under .75 inch at 100 yards.

I would like to cut the barrel down from 26 to 23 inches to make it handier in the field and in the woods that I often hunt. My first question is how much will this drop the velocity? And do you think this is a good idea?

I will use this rifle mostly for hunting whitetail deer and am looking for load data, which leads me to my next question. I will probably use either Nosler 140-grain Ballistic Tip or Hornady 140-grain SST bullets. What powders will give the best combination of accuracy and velocity? With powders so hard to obtain, it would be great if you could offer loads with two or three different powders as optional choices.

I always appreciate the great technical information you provide, and thank you in advance for your insight.

– A.P., West Virginia

When handloading 140-grain bullets in the 6.5 Creedmoor, Hodgdon Superformance, Hybrid 100V and Winchester 760 are top-performing powders.

A: *I have tested several rifle (and handgun) cartridges with different barrel lengths, even cutting the same barrel down one inch at a time to accurately determine velocity changes per inch of barrel. What I have learned is that each cartridge responds differently to barrel length changes. To make matters more complex, different loads and powder combinations will produce different results. Since I have not conducted specific tests for the 6.5 Creedmoor, I can only offer an educated guess to answer your question. I would estimate a loss of 25 to 35 fps per inch of barrel cut off. Cutting the barrel back to 23 inches will certainly make your rifle handier to carry in the field, reduce weight and in my opinion is a practical idea.*

There are many powders that will give excellent accuracy and top velocities in the 6.5 Creedmoor. I might suggest 43.0 grains of Hodgdon Hybrid 100V, 44.0 grains of Superformance or 43.0 grains of Winchester 760 with either of the 140-grain bullets you mention. Each load will exceed 2,700 fps and should prove accurate. Please note that these are maximum loads, so you should begin with charges that are at least 5 percent below maximum (40.0 to 41.0 grains) and use a large rifle "standard" primer, such as the Federal 210 or CCI 200.

Good luck on your deer hunts.

.375 H&H

Q: I am planning and preparing for a plains game hunt in Zimbabwe and am trying to figure out what guns and loads to take. I am considering taking one rifle chambered in .375 H&H Magnum for everything from impala to Cape buffalo (the largest animal that I plan to hunt). I know there is considerable discussion as to "solid" versus "expanding" bullets on buffalo in this caliber, but I would like your opinion on that subject before making my choice.

My second question is tied to the first. If I take only the .375, I will need an expanding bullet load for the lighter game. Can you suggest a bullet and load that will shoot to the same point of aim as the bullet that you recommend for buffalo?

– T.R., Buda TX

Solid versus expanding bullets for hunting Cape buffalo with a .375 H&H Magnum is a highly debated subject.

A: *You are correct; this is a very controversial and often debated subject, which probably mostly started a century ago when soft-point bullets gave less than perfect performance on heavy game. I know professional hunters who stand firmly on each side of this issue. In my opinion, however, either a solid or an expanding bullet will work, but they must be applied correctly for satisfactory results. For example, a professional hunter who had to follow up a wounded buffalo would probably be ahead to choose solids to achieve maximum penetration from any angle, especially on a wounded and angry buffalo coming straight on, although most professionals opt for a larger caliber for a stopping cartridge. The .375 H&H is technically a*

medium-bore cartridge and solids will not deliver the same amount of shock as many of the big-bore "stopping" cartridges.

Hunting buffalo is a completely different matter, because the hunter has the option of waiting until circumstances are just right to perfectly place the first bullet in the vitals and at much better angles. In this circumstance an expanding bullet is preferred as it will destroy more tissue, and the best bullets can break bone and continue penetrating. Be certain to use a toughly constructed bullet that is designed for deep penetration, such as the Barnes Triple-Shock X-Bullet, Swift A-Frame or similar bullets, with 300-grain versions generally preferred.

The .375 H&H Magnum is one of the best cartridges for being able to switch loads and still place bullets close to the point of aim, even loads containing different weight bullets. Each rifle has its own personality, however, and you will need to compare the point of impact of your "lighter game" bullet choice with your buffalo load to check for possible changes. If you were to choose a tough expanding bullet for buffalo, you might be ahead to use that same load on all game.

Good luck and I hope that you have a great time.

.280 Ackley Improved

Q: I just read your article on the .280 Ackley Improved in *Rifle* magazine with great interest, as just days previously I had purchased a Kimber Model 84L but in the Montana version. I agree with you that this is an outstanding cartridge.

I am still waiting on the scope to arrive and have been considering what handloads to begin with. I am primarily an elk hunter and would like to try the Barnes 140-grain Tipped TSX or the proven Nosler 160-grain Partition. Can you suggest load data with those two bullets to give me a place to begin? It would be great if you could suggest one powder that will work well with both bullet weights.

– D.S., Butte MT

A: *You don't specify any particular powder, and knowing that many types are simply not available, I will give you some options. I have had particularly good results with Accurate Magpro. Using the Nosler 160-grain Partition, I suggest beginning with 59.0 grains and working up to a maximum charge that will probably be around 63.0 grains, for around 2,800 to 2,850 fps. If you prefer an extruded powder, begin with 51.0 grains of IMR-4831 and*

(Continued on page 66)

When handloading the .280 Ackley Improved, IMR-4831, Alliant Reloder 22 and Accurate Magpro are top-notch powders.

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295 or 300 Rook

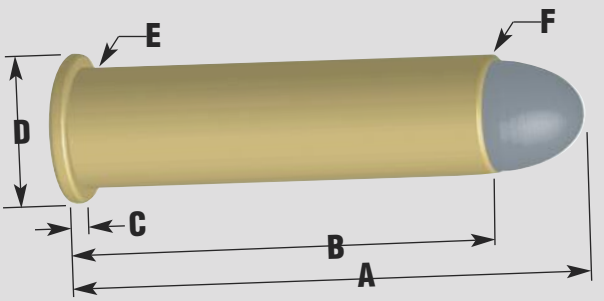
CARTRIDGE BOARD by Gil Sengel

The 300 Rook (we will get to the 295 part later) is an early black-powder British round. It was fired in little single shots known as rook and rabbit rifles, with a rook being a bird related to our crow and a rabbit being, well, just a rabbit. In America we call them small-game rifles and cartridges.

Shooting rabbits is pretty straightforward, but how does one go about shooting birds with a rifle? It is only logical that the birds weren't flying. Yet after one shot, they would be flying, not to be seen again. Well, not exactly.

Rooks nest in large concentrations. Like a crow, they will eat anything but seem to prefer grain and the eggs and young of birds, especially ground-nesting game birds. This was not appreciated by landowners who destroyed rooks whenever possible. The birds even helped the process along.

In the spring before the fledgling rooks could fly, they had a propensity to sit on limbs outside the nest and peer down at farmers. Recognizing an opportunity, and a chance to have some fun at the same time, farmers, landowners and their friends acquired small-caliber muzzleloading rifles and picked the little vermin off their perches. With the advent of cartridge rifles, rook shooting often became a social event. Men, women and children took turns sniping the feathered pests, all the while considering it wonderful entertainment.



Cartridge Dimensions

A - Overall Length ----------1.38	**D** - Rim Diameter ----------.369
B - Case Length----------1.17	**E** - Head Diameter ----------.319
C - Rim Thickness----------.052	**F** - Neck Diameter----------.317

It has been written that young rooks were fine table fare. I suspect, however, this story is similar to those I heard about cooking snipe, coot and woodcock in my youth. Basically, the bird is tacked to a clean pine board, herbs and spices added, then cooked until tender. At this point the carcass is removed from the lumber and buried in a deep hole. One then eats the board.

At any rate, the best grades of English black powder were the finest in the world. Matching powder, grease wad and bullet weight in the early cartridge rifles allowed some control over the amount of fouling produced. Caliber could be decreased while maintaining adequate accuracy. Rook cartridges, such as the 380 Long, 360 No. 5, 320 Long and 300 Rook, became available starting in the early 1870s.

The 300 Rook emerged as the smallest cartridge that could maintain its precision for the 30- to 50-yard shots required for rooks. Cartridges using lesser bullet diameters became available around 1900 as smokeless powders were

developed. It should also be mentioned that British rounds having the same or similar bullet diameters but somewhat larger powder charges existed at the same time as the rook cartridges. Some were for target use. Others were fired in what were termed *miniature rifles*, the intended quarry being game the size of small deer, definitely not rooks or rabbits.

How the 300 Rook came about begins with a common percussion pistol caliber, the .32. Such guns had bore diameters of more or less .320 inch. It was well known that the small guns had a deterrent effect but weren't very effective if it became necessary to pull the trigger. In an effort to increase the penetration of the percussion handgun, conical bullets replaced roundballs. When the first metallic cartridges appeared, it seemed logical to simply reduce the diameter of the conical bullet slightly at the rear and poke it into the case. Thus the case and much of the front of the slug were the same diameter. All early cartridges used such a *heeled* bullet – think modern .22 Long Rifle ammunition.

The earliest .32 was probably the .32 Short Centerfire (talking British rounds here) that appeared about 1869. Case length varied from about .600 to .700 inch. At nearly the same time a round called the .32 Long Centerfire appeared for Webley and Tranter revolvers. Case length was .830 inch. Strangely, this round is later listed as 320 Long Centerfire (perhaps using a lighter bullet) and then the 320 Rook. For comparison, it was nearly identical to the .32 S&W Long, except the British round used a heeled bullet.

The heeled bullet was plagued by its externally applied lube cracking and falling off in cold weather, becoming sticky in warm conditions and simply wearing away any time rounds were carried in a pocket. About 1880, the 320 Rook bullet was reduced in diameter so it fit *inside* its case. This supposedly left its diameter at .300 inch, more or less. Case length was in-

creased some .350 inch to cover the lubed portion of the slug and provide space for a couple of grains more powder. This work is said to have been done by (or for) Holland & Holland. In H&H advertising, the cartridge was called *Hollands 295* or the *295 Bore Rook*.

Major ammunition maker Eley first listed the new round in 1885. Kynoch followed in 1886 (H&H was selling rifles in 1882), but for some reason known to neither man nor rook, both makers called it the *295 or 300 Rook*! Some insist the *300* is bullet diameter. Others opine the *295* indicates bore diameter. I can't say for certain, having no record of slugging a 300 Rook barrel, but I have measured a .300 Sherwood (a slightly more powerful smokeless powder contemporary), and its bore was .295 inch. Given a groove depth of .004 inch a .300-inch diameter slug would be too small. Perhaps the black-powder explosion expanded the bullet to fit. The rooks and rabbits didn't seem concerned.

The standard black-powder load for the 300 Rook was 10 grains behind an 80-grain lead roundnose. That's not quite equal to the .32 S&W Long pistol round. Muzzle velocity is given by Kynoch as 1,100 fps from the rifle barrel.

Eley sometimes labeled its black-powder cartridge boxes .300-10-80 with no other identification. Also, early Eley rounds are seen with an obviously heavier bullet, at least 100 grains. These cases are head-stamped "ELEY 295." This bullet would require a long, freebored section in the chamber throat while the common 80-grain bullet would need none. Just what was going on here is impossible to say at this late date. All references just refer to the 295 or 300 Rook as one cartridge only.

The round began to be loaded with smokeless powder about 1900. This gave the 80-grain bullet (solid or hollowpoint lead) a muzzle speed of 1,150 fps. It also marked the beginning of the end, because smaller calibers could now equal the 300 Rook's accuracy at iron-sight ranges – and it didn't take much power to kill a rook. Kynoch listed the round until 1961, near the end of its sporting ammunition production. Eley stopped in 1919 when it was merged with other ammunition and explosives companies. Today the round is for handloaders only.

The 295 or 300 or whatever Rook cartridge will never disappear entirely because of the beautiful single-shot rifles that chambered it. Some were plain types similar to our Stevens, but a large percentage were side-lever, Martini and especially break-open guns. Nice wood, good bluing and engraving were common. Then there were the Holland & Hollands, Jefferys, Westley Richards – all the best makers – who produced cased rook rifles that are simply exquisite.

Fortunately there is a renewed interest in these rifles today. I am told they are even being shot in informal competition in England, the U.S. and Australia. Wouldn't it be wonderful if someone sold small falling-block, Martini or break-open actions today, so such rifles could again be built? Perhaps we could invent a lead bullet, black-powder silhouette game in which the cut-outs were – what else – rooks and rabbits. ●

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Accurate 2495

PROPELLANT PROFILES by R.H. VanDenburg, Jr.

Accurate Arms and Machine was established as a custom gun shop in 1946 in the Chicago area. Thirty years on, in 1976, the company expanded to include the sale of surplus powders purchased from the U.S. government. Packaging and shipping took place in Lake Villa, Illinois. In 1980, the company moved to a much larger facility near McEwen, Tennessee. By 1983, the company had begun to import newly manufactured propellants. By 1990, Accurate, now Accurate Arms Company, Inc., had a substantial line of smokeless canister powders for reloading. The powders were manufactured by Israel Military Industries (IMI) in Israel. That same year also saw the introduction of a popular flake shotshell powder, Nitro 100. Not long after, a new extruded rifle powder was added to the line, 2495 BR.

This powder, a very fine one and still in the Accurate lineup, has had a somewhat convoluted history. Initially manufactured in Israel, as noted, an explosion at the factory ultimately forced Accurate to switch its source to the Czech Republic. Interestingly, some lots of 2495 that reached American shores were manufactured by Somchem, a division of Denel (PTY) Ltd. in South Africa. In 2005, there was an additional change as Western Powders of Miles City, Montana, purchased the smokeless powder division of Accurate Arms and all testing, packaging and dis-

tribution were moved to Montana. In recent years, Western has consolidated its powder sources closer to home. Extruded powders, including 2495, are now manufactured at the Ontario, Canada, plant where IMR powders are made. Most, if not all, of Accurate's ball powders are now made by St. Marks Powders in Florida. Both facilities are part of General Dynamics.

In addition to its history of multiple sources, the powder has gone through several iterations in its name. It was originally introduced as 2495 BR. Accurate literature suggested it was the very best powder for use with cast bullets in the .45-70 cartridge. After the introduction of 5744, Accurate dropped this recommendation. The 1997 Accurate catalog showed a change to an XMR prefix for all of its extruded powders. By 2000, the prefix had been dropped, and the entire line of rifle powders simply had a four digit name, e.g., 2495.

Narrowing the focus, 2495 is a single-base, extruded powder. Its burning rate is similar to that of IMR-4895. Prior to being manufactured in Canada, 2495's specifications were an average kernel length of .068 inch and an average diameter of .029 inch. Its bulk density has been variously reported as .880 gm/cc and .900 gm/cc. Neither is a cause for alarm, as reported density has always allowed for a range, and both would be within specifications. With the move to Canada, however, specifications changed, giving the powder a short-cut geometry and thereby improving its metering qualities. Current dimensions, as close as I can measure, suggest a diameter of .038 inch and a length of .047 inch. Burning rate, ostensibly, has not changed.

Accurate 2495 is still a very versatile powder, finding a home in a range of cartridges from the .17 Remington to the .45-70. Both Accurate and Hornady are good sources for laboratory-tested, published loading data, although neither lists the source of its specific test lots of the powder. All my tests were conducted using a new lot manufactured in Ontario, Canada, and is of the new "short-cut" variation.

Although sometimes listed with the .223 and .22-250 Remington cartridges, 2495 did not seem to me to be the best fit, so I began my review with the .243 Winchester. Here the powder is quite good with lighter-weight bullets, and I selected a 58-grain Barnes. My results were consistent with published Accurate data.

When I moved to the .257 Roberts, where 2495 also is best suited to lighter-weight bullets, I restricted my review to the use of the Hornady 87-grain Spire Point (SP) bullets and promptly ran into my first problem. The *Hornady Handbook of Cartridge Reloading, 9th Edition* clearly states its .257 Roberts data was developed in cases marked "+P" and its powder charges designed to give "+P" pressures. Standard SAAMI .257 Roberts maximum average pres-

Selected Loads Accurate 2495

cartridge	bullet (*grains*)	charge (*grains*)	velocity (*fps*)
.243 Winchester	58	40.0	3,447
.257 Roberts	87	37.5	2,888
.30-30 Winchester	170	32.0	2,094
.30-06	110	56.0	3,204
|	150	51.5	2,857
.303 British	150	46.0	2,710
8mm Mauser	150	50.0	2,831

Notes: The .243 Winchester, .257 Roberts and 8mm Mauser have 24-inch barrels. The .303 British and .30-06 have 22-inch barrels, and the .30-30 Winchester has a 20-inch barrel. Federal 210 standard primers were used throughout.

Be Alert – Publisher cannot accept responsibility for errors in published load data.

sure is 51,000 psi; the .257 Roberts' +P comparable limit is 54,000 psi. Hornady's barrel length was 22 inches. My custom Springfield sports a 24-inch tube and is long-throated to accept the heavier bullets without taking up available powder space. In spite of the longer barrel, I came no where near Hornady's projected velocities. Is this all the result of the long-throat chamber, or could different sources have contributed to the difference? From previous testing with this cartridge, I suspect the throating is the culprit but also the overall cartridge length chosen. I'll need more powder to approach Hornady's projected speeds even with my longer barrel. This would not be an option with a standard-throated rifle.

Older Accurate load data for the .30-30 Winchester used a 20-inch test barrel. The most recent data was developed using a 24-inch pressure barrel, and allowable powder charges have changed significantly. In both instances, a Model 94 Winchester produced speeds with 170-grain bullets that fell right in line with Accurate's projections, adjusting for differences in barrel length where applicable, of course. Accuracy was consistently good. The most recent data was used throughout.

In the .30-06, 110-grain bullets compared favorably to Hornady's, given that my barrel is 22 inches versus 23¾ inches. With 150-grain bullets, another problem came up. Accurate's older published maximum powder charge was 51.5 grains with a 150-grain bullet; the latest Accurate data does not list 2495 with the cartridge with any bullet. Hornady's maximum with its 150-grain SP is 47.9 grains. Accurate's barrel was 24 inches. Both Accurate and Hornady projected a 2,900 fps velocity. It appears the older Accurate data would have to be followed to reach such speeds in my rifle. Here is an instance where beginning with the starting loads and carefully increasing charge weights as conditions warrant is imperative. Your rifle may insist on adhering to Hornady's data; mine did not.

Next was the .303 British and a similar discrepancy. Hornady's data was developed in a Lee Enfield Mark 4 No. 2 with a 25¼-inch barrel. Maximum powder charge with 2495 under a 150-grain bullet was given as 38.8 grains for a projected 2,600 fps. Accurate also used the Hornady 150-grain SP but developed its data in a Douglas test barrel of 24 inches. Its maximum load was listed as 46.0 grains with a projected velocity of 2,727 fps. Since I chose to use a Ruger No. 1 with a 22-inch barrel, I felt comfortable using Accurate's heavier powder charges. My velocities were just a tad short of Accurate's, even with the shorter barrel, and overall performance was excellent.

The final cartridge tested was the 8mm Mauser. I was limited to Hornady data but we both used 24-inch barrels and, to make a long story short, I was able to equal Hornady's projections of muzzle velocity with a bit over a full grain of powder less than that listed as maximum. Hornady's 51.2 grains of 2495 was to give 2,800 fps; my load of 50.0 grains clocked 2,831 fps; a load of 51.0 grains gave an impressive 2,921 fps. Much like the .303 British, overall performance was outstanding.

This review of Accurate 2495 does point out several things of note. Powders with different sources certainly demand cautious handloading with a particular emphasis on beginning with starting loads. Also, reloading source manuals can differ greatly in their approach, the guns used and pressure levels found acceptable. One must read carefully and begin low and work up carefully. All that said, I found Accurate 2495 to be a very good powder, providing clean burning, extreme velocity spreads that were on the small side and groups from acceptable to very good. Not bad for a powder that has seen four sources, three names and two dimensional standards. •

Rim Rock Cast Bullets

FROM THE HIP by Brian Pearce

Frank Brown began producing Rim Rock bullets in 2005 and eventually moved production to a facility in Polson, Montana. Over the years, with his wife, Susan, and son Frankie and around two dozen employees, he has expanded the product line to include nearly 200 different bullet designs in four distinct product lines known as Cowboy, Standard Hard Cast, Premium Hard Cast and Premium Gas Checked. They are produced in popular calibers ranging from .25 through .50 for rifles and handguns that include modern and traditional designs. They offer something for practically every shooter.

Two top-notch .44-caliber bullets from Rim Rock include the 240-grain SWC-HP and the 255-grain SWC. Both feature gas checks and are excellent choices for assembling accurate handloads in either the .44 Special or .44 Magnum.

One of the unique things about Rim Rock is that it uses different alloy blends for various applications. For example, Cowboy and Standard Hard Cast bullets are cast with an alloy consisting of 2 percent tin, 7 percent antimony and 91 percent lead, which results in a Brinell hardness number (BHN) of around 15. Premium Hard Cast and most of the Gas Checked bullets are cast with a blend of 4 percent tin, 10 percent antimony and 86 percent lead for a BHN of around 22. There are also other specialized alloy formulas to enhance performance of a given bullet.

Rim Rock often produces one particular bullet for 10 days on four machines, which results in around 1 million bullets being produced during that time. This helps eliminate variables in alloys, and along with mixing alloys in large quantities, it helps to keep bullets unusually consistent. Several ammunition companies are using Rim Rock bullets in rifle and handgun loads and praise the accuracy and consistency obtained with them.

Although there are many outstanding bullets in Rim Rock's product line, there are two .44-caliber bullets I have been extremely impressed with and believe that readers will likewise find them interesting for use in .44 Spe-

Table I

.44 Magnum Handload Data

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)
240 Rim Rock SWC-HP w/gc	A-7	15.0	1.663	1,234
		15.5		1,270
		16.0		1,313
	CFE Pistol	10.5		1,157
		11.0		1,198
		11.5		1,241
		12.0		1,279
	2400	19.0		1,186
		20.0		1,252
		21.0		1,348
		21.5		1,394
255 Rim Rock SWC w/gc	Longshot	10.5	1.663	1,118
		11.0		1,165
		11.5		1,218
		12.0		1,266
	A-7	15.0		1,218
		15.5		1,265
		16.0		1,321
	2400	19.0		1,174
		20.0		1,247
		21.0		1,355
		21.5		1,388

Notes: A Smith & Wesson Model 629-1 with a 6-inch barrel was used to test-fire the above loads. Starline cases and CCI 300 primers were used throughout. Bullet diameter: .430 inch; maximum case length: 1.285 inches; trim-to length: 1.275 inches.

Be Alert – Publisher cannot accept responsibility for errors in published load data.

cial and .44 Magnum revolvers. These include the 240-grain HP-SWC and 255-grain SWC, both fitted with gas checks. Although Rim Rock made the final design specifications, with Steve Brooks cutting the moulds, Tim Sundles of Buffalo Bore Ammunition shared in their design features and employs both bullets in his .44 Special and .44 Magnum factory loads.

Rim Rock offers several hollow-point cast bullets in .38/.357, .44 and .45 calibers. The .38/.357 158 grain and .45 caliber in 225-grain weight are cast with an extremely soft alloy containing 40 parts lead and one part tin (for around a 6 BHN) that will reliably expand at velocities below 800 fps (similarly to a pure lead bullet), but with the gas check there are no barrel leading problems. The .44-caliber, 240-grain SWC-HP (as well as the .45-caliber, 260-grain SWC-HP) is cast with a 12 BHN and features a generously large and deep hollow-point that reliably allows expansion at velocities of 1,000 fps.

The Rim Rock 240-grain SWC-HP (left) and 255-grain SWC (right) feature gas checks, generous square bottom crimp grooves, meplats that measure around .325 inch and nose lengths of around .375 inch.

The .44-caliber, 240-grain SWC-HP features a nose length around .375 inch, while the meplat measures .325 inch wide. It also features three driving bands with the forward and middle bands measuring .075 inch wide, while the lower one is around .090 inch. The crimp groove is unique, as it is square-bottomed and measures around .016 inch deep and .050 inch wide. This allows a heavy roll crimp in neck-down style or the more traditional radius roll crimp. Properly

Table II

.44 Special Handload Data

Handloads marked with an asterisk (*) are generating +P pressures and exceed SAAMI guidelines for the .44 Special that are currently established at 15,500 psi. These loads should **only be used in** Smith & Wesson Model 1950 Target/Model 24, Ruger New Model Blackhawk, Freedom Arms Model 97 and guns designed to handle pressures up to 25,000 psi.

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)
240 Rim Rock SWC-HP w/gc	Power Pistol	8.0	1.540	1,045
		8.6		1,108*
	VV-3N37	8.0		931
		8.5		980
		9.0		1,055*
	A-5	8.5		957
		9.0		1,003
		9.5		1,050
		10.0		1,103*
	A-7	11.0		1,070
		11.5		1,110
		12.0		1,138*
	Longshot	9.0		1,129*
		9.5		1,180*
	CFE Pistol	6.5		890
		7.0		947
		7.5		1,006*
	2400	16.0		1,156*
		16.5		1,192*
		17.0		1,233*
255 Rim Rock SWC w/gc	Power Pistol	8.0	1.540	1,034
		8.6		1,094*
	A-5	8.5		960
		9.0		1,000
		9.5		1,046*
		10.0		1,091*
	A-7	10.5		1,016
		11.0		1,042
		11.5		1,082
		12.0		1,123*
	Longshot	9.0		1,122*
		9.5		1,164*

*** see caveat above**

Notes: A Ruger Blackhawk, Clements Custom No. 5 with a 5½-inch Douglas Premium barrel was used to test-fire these loads. Starline cases and CCI 300 primers were used throughout. Bullet diameter: .430 inch; maximum case length: 1.160 inches; trim-to length: 1.150 inches.

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crimped, bullet creep is minimal, and with any reasonable load bullets will not jump crimp. For example, when heavily crimped and subjected to the repeated fast recoil from full-house .44 Remington Magnum loads fired in a Smith & Wesson Model 329PD weighing 26.5 ounces, bullets stayed in place. The same cannot be said of many jacketed bullets in popular factory loads.

From a production standpoint, the above hollowpoint is comparatively difficult to produce, as gas checks must be installed by hand, and since the alloy is too soft to be processed through automated sizing machines, which cause deformation, the sizing/lubing operation is likewise done by hand. As a result, quality is high.

The .44-caliber, 255-grain SWC "solid" bullet shares the same nose length, crimp groove and profile as the above 240-grain hollowpoint bullet, but being heavier and longer, it seats approximately .048 inch

Brian found Rim Rock bullets to offer unusual accuracy, with many 25-yard groups measuring under one inch in the Smith & Wesson Model 629-1 .44 Magnum and custom Ruger Keith Number 5 .44 Special.

deeper into the case and is cast harder with a BHN of 22. Several years ago, when I first saw this bullet, I was impressed with its features and design. I have tried it at velocities ranging from 850 to 1,500 fps and at distances out to 400 yards, and it has proven to be a stable design. It certainly has similarities to the classic Lyman/Thompson-designed bullet 429244 but with a slightly larger meplat and a deeper and larger crimp groove.

There has been much discussion and many debates on gas check versus plain-base cast bullets in sixguns. Both can work extremely well; however, for guns that are prone to barrel leading due to a rough bore, a tight fitting frame/barrel junction that can cause a bore constriction or incorrect throat sizes, a gas check is a great option. Furthermore, a gas check allows a comparatively soft alloy to be used, such as with the above hollowpoint bullets, which helps prevent leading while permitting rapid expansion.

Loads were developed for the .44 Special using a custom built Ruger Blackhawk converted to a Keith Number 5 pattern (by Clements Custom Guns) with a line-bored cylinder and 5½-inch octagonal barrel. This gun features minimum dimension chambers, .430-inch throats, a tight barrel/cylinder gap and a match-grade barrel. As a result it usually produces around 25 to 50 fps greater velocity than most "production" .44 Specials with the same barrel length.

With select loads, several 25-yard groups clustered into a ragged hole using both the 240-grain SWC-HP and 255-grain SWC bullets. Select examples using the 240-grain SWC-HP bullet include 8.6 grains of Alliant Power Pistol (1,108 fps), 10.0 grains of Accurate No. 5 (1,103 fps), 9.5 grains of Hodgdon Longshot (1,180 fps) and 17.0 grains of 2400 (1,233 fps). Switching to the 255-grain SWC bullet 12.0 grains of Accurate No. 7 (1,123 fps), 9.5 grains of Longshot (1,164 fps) and 8.6 grains of Power Pistol (1,094 fps) gave outstanding results.

Please note that many of the loads in Table II exceed current industry pressure limits as established by SAAMI at 15,500 psi – and are marked with an asterisk (*). These loads should ***only*** be used in guns designed to handle the increased pressures, such as the Smith & Wesson Model 1950 Target (aka Model 24), Ruger New Model Blackhawk, Freedom Arms Model 97 and revolvers with similar strength.

For developing .44 Magnum data, a Smith & Wesson Model 629-1 with 6-inch barrel was used. With the 240-grain SWC-HP, the best groups easily stayed within one inch at 25 yards and were obtained with velocities that hovered around 1,300 fps. This seemed to be a "sweet spot," if you will. Loads included 16.0 grains of Accurate No. 7 or 12.0 grains of Hodgdon CFE Pistol. Alliant 2400 gave the highest velocity with 21.5 grains reaching nearly 1,400 fps and groups still hovered close to an inch. Switching to the 255-grain SWC bullet, loads in Table I produced velocities ranging from 1,150 to almost 1,400 fps. The accuracy differences were minimal with most loads grouping around one inch. The single tightest group was produced using 15.5 grains of Accurate No. 7 for 1,265 fps.

The Rim Rock SWC gas check bullets are excellent choices for general-purpose use in .44 Special and .44 Magnum sixguns. They are well designed, accurate and perform well on game and can be purchased factory direct at www.rimrockbullets.net. ●

Bottleneck Handgun Cartridges

MIKE'S SHOOTIN' SHACK by Mike Venturino

Bottlenecked handgun cartridges are an interesting subject, at least those meant for repeating handguns, not the single shots that can accommodate about anything. My thoughts here are of rounds such as .30 Mauser, .30 Luger, 8mm Nambu, 7.62x25mm Tokarov and the much later .357 SIG.

Since 1893, the 7.63mm Mauser (aka, .30 Mauser) can be considered the beginning of bottlenecked autoloading pistol cartridges. For perspective, consider this: Colt did not warranty the famous Single Action Army/Peacemaker for smokeless powders until 1900. Some readers might be thinking that the Broomhandle Mauser didn't come out until 1896, which is true, but the huge, toggle-link pistol designed by Hugo Borchardt was earlier still. It chambered the .30 Mauser.

In 1900 the semiautomatic pistol that came to be ultrafamous as the "Luger," (although none were so stamped) was introduced. Its initial caliber was 7.65mm Parabellum (.30 Luger), a bottlenecked case of .85 inch taking a 93-grain metal-jacketed bullet. A couple of years later, someone decided to blow that case out straight, cut it back to .754 inch, fit it with .355-inch bullets and call it the 9mm Parabellum.

Let's go farther back in history to 1873, when Winchester Repeating Arms introduced its first centerfire cartridge, the .44 Winchester Centerfire (.44 WCF). Then in 1879, the company squeezed it down to take .400-inch bullets and called it the .38 WCF. Now, it is hard to claim that the .44 WCF is truly a bottlenecked case, although in strict parlance it is. However, the .38 WCF is most certainly bottlenecked.

A bottleneck case shape is supposed to be troublesome in revolvers, because the cases are forced back in the chambers as they expand, consequently tying up against the frames' recoil shields.

The first truly successful autoloading pistol – the Mauser Model 96 – used the bottlenecked 7.63mm Mauser.

That may happen with more recent high-performance bottleneck cartridges, such as .256 Winchester or .22 Jet, but the .38 WCF has never been problematic in the dozens of Colt revolvers I've fired it through. Never, nary once, has a .38 WCF revolver cylinder demonstrated the slightest hesitation when I asked it to turn.

Back to autoloaders: Cartridge designers for those earliest autoloaders evidently figured a bottle-

Some of the early bottlenecked autoloading pistol cartridges are (left to right): 7.63mm Mauser (.30 Mauser), 7.65mm Parabellum (.30 Luger), Japanese 8mm Nambu and Soviet 7.62x25mm Tokarov.

Two modern bottlenecked autoloading pistol cartridges are: (1) .357 SIG and its (2) .40 S&W parent round. At right are the proprietary (3) .440 Cor-Bon and its (4) .45 ACP parent round.

necked case could headspace on the case shoulder, as did early rifle rounds, such as 7mm Mauser and 7.9x57mm, which gained the misnomer "8mm Mauser" in this country. This would allow case mouths to be crimped into bullet cannelures if the manufacturer so desired. The cases could be rimless, which never hurts functioning in autoloading firearms. (Actually .30 Mauser and 7.65mm Parabellum have a tiny bit of rim extending past the case body, but it's a matter of a few thousandths inch at most.)

As the Japanese were wont to do in the early decades of their modernization, they managed to copy the western nations while retaining some national individuality. By that I mean that Japan's 8mm Nambu pistol cartridge, introduced circa 1904, leaned heavily on the contemporary 7.63mm Mauser and 7.65mm Parabellum case shapes but in no way shared their dimensions. The two European rounds have rim diameters of .393 inch according to *Lyman's Reloading Handbook #49*, but according to *Cartridges of the World 9th Edition*, the 8mm Nambu's rim diameter is .413 inch. The Mauser and Parabellum rounds both used .308-inch bullets, but the Nambu's is .320 inch.

The Russians also have never been bashful about copying, so in 1930 they took the 7.63mm Mauser case and renamed it 7.62x25mm Tokarov when it was put into the country's TT30 and TT33 pistols. Indeed they did soup it up a bit, so despite the almost exactly shared dimensions, the Russian- and later Soviet bloc-manufactured 7.62x25mm Tokarov should never be fired in old Model 1896 Mauser pistols.

Mike considers the .38 WCF (.38-40) as the only truly successful bottlenecked cartridge used in revolvers.

Now fast-forward a good six decades, and we have firearms and/or ammunition makers returning to bottlenecked cartridges for autoloading pistols. Sig and Federal collaborated on the .357 SIG for its 1994 introduction. In essence it is the .40 S&W case bottlenecked down to take .355 inch (*not* .357-inch) bullets. It has been well received in law enforcement circles. Interestingly, however, those companies chose to design the .357 SIG to headspace on its case mouth, as do rounds like .45 ACP, 9mm Luger and .40 S&W, instead of on its case shoulder. Of course, that precludes a roll crimp and, to me at least, seems like an odd move.

There have been other bottlenecked autoloader cartridges dreamed up by wildcatters over the years. The .45 ACP necked down to .38 caliber is perhaps the best known. I even found some cases so formed in my ammo/bullet/powder shed, although I have no memory of ever even seeing a .38/.45 pistol.

In the arena of proprietary cartridges, there have been some bottlenecked autoloader pistol developments. About the same time the .357 SIG was developed, ammunition maker Cor-Bon came out with a .440 Cor-Bon. It's the .45 ACP necked down to .40 caliber. I also found some of that factory ammunition in my shed and likewise don't remember ever viewing a pistol so chambered.

I have done extensive shooting with the earlier bottlenecked autoloader rounds: Mauser, Parabellum, Tokarov and Nambu and even a modicum of reloading with a .357 SIG. They have all worked well. ●

From the Range

PISTOL POINTERS by Charles E. Petty

Ever since I donned Air Force blue in my teens, my life has revolved around some form of shooting – mostly bullseye pistol or, later, IPSC and PPC but also a little high-power rifle and a good bit of skeet. I've spent days and weeks at ranges all around the country and some of the world. I got to breathe the rare air with the best of the best at the USAF Marksmanship School and learn from, and eventually compete with, them too. Of course, we had to compete against men just as serious, whose only flaw was that they joined another branch of the service.

The experience of building and shooting serious target pistols opened the door that I pass through every day and gained access to people and places I would have only dreamt of. Most serious competitive shooters wouldn't stand out in a crowd, but a short conversation will usually reveal the difference between real and Memorex. There is a special community where the guy whose goal in life is to beat you will lend you a gun if yours goes down or offer advice that might help you beat him.

Serious competitive shooting is largely a mental endeavor, because it is ever so easy to talk yourself out of a good score. Many years ago I stood beside the late Maj. Frank Green as we looked at posted scores, and he talked openly about what he would have to shoot the next day in the .45 match to win the National Championship. The score he mentioned was, at least in my world, stratospheric, but the next day he beat it by a point or two and won Camp Perry.

The first major saying I remember was uttered by my coach, the late MSgt Fred McFarland. He would stand beside me looking through the scope and say, "Call that shot." More than once I cried, "Come back!" when the front sight took a nosedive as I jerked the trigger.

There was a monthly 2,700-point match at Lackland, and I shot

them all, and several times a year we'd get TDY to shoot somewhere else. The guys on the big team traveled a lot more, starting in Florida in February or March and ending at Camp Perry in the summer. There were also big matches like the All Air Force, usually held at Lackland, and the Inter Service, which moved around. When I left I was the proud owner of a Master card from the NRA, but a terror in the Expert class becomes an also-ran master until the skills improve . . . a bunch.

The ability to call a shot is key to any degree of precision in launching bullets. It is one of those things far easier said than done and requires one to know the relation of the sight to the target at the moment the shot breaks.

This also leads to the cardinal sin of shooting: jerking the trigger. As we learn to shoot, we know where the sight *should* be when the gun fires, so there is an incredible urge from the brain to tell the trigger finger ***now***. The result will almost always be bad.

We often are told about the desirability of a "surprise break." The term is a little misleading, because surprises often trigger the startle reflex, which we don't want. A better way to think of it is that if we know the instant the gun will fire, we jerked the trigger. If we put enough pressure on the trigger and hold it, however, the recoil will sort of sneak up on us with no harm.

The best saying on the subject came from the late Carlos Hathcock: "Press the trigger, ***wait*** for the recoil." It applies equally to rifles or handguns and is the most basic of truths. A similar saying attributed to Jeff Cooper is, "Front sight . . . press."

The undying popularity of Mr. Browning's 1911 and its .45 ACP cartridge makes it a huge seller in every segment of the market. When Ruger and Remington started offering 1911-style pistols, I saw that as proof of a virtually bottomless market, and then I see custom shop prices hover near $5,000 and shake my head in wonder.

I have quite a few pistols built in the 1970s to 1980s that would compete well with anything today in terms of accuracy and function. Cosmetics have come a long way since then, and lots of folks buy those. I've seen some custom pistols that were truly works of art, but there is also an element that equates cost with quality. "How much you paid for the gun has nothing to do with whether or not you can shoot." I've always liked, "You can't buy skill."

I was participating in a class with new shooters, almost all of whom were women, and one of them asked the instructor about the .380. He began his answer with it wasn't powerful enough, and I still can't believe I interrupted with "B...s..., the gun you have when you really need one is the best gun in the world."

Sometimes good sayings emerge by accident. I've spoken of the 14-inch diameter steel gong that lives 70 yards away at my range. We shoot at it regularly. One day a new shooter wandered up just as a friend nailed the gong solidly. "He hit it," the guy exclaimed. The little devil sitting on my shoulder said, "Heck . . . anyone can miss it."

One of the highlights of my service was to get to know and hunt with the late Jim Clark. In my new career, he became a valuable resource, and he always had an hour or more for talks at the SHOT Show. One subject was whether or not those newfangled weights and comps really worked. "If you *think* it helps, it does," he said.

That was in the early days of IPSC, which were closely followed by the craze for magazine capacity. Even though the Browning P-35 with 13 rounds was known and loved, it got no traction in IPSC, because it was a "minor" caliber.

The first thing we saw were longer magazines that stuck out the bottom of the pistol and then came wide bodies of all sorts. Pretty soon consumers were asking for the highest magazine capacity as a buying guide. All of this prompted Safariland's great shooter Tommy Campbell to ask, "Are you planning on missing a lot?"

One saying I just heard must remain anonymous to avoid embarrassment to the speaker, but it's too good to leave out. Not long ago, a friend who is a very good shot was shooting a custom 1911 9mm and was having numerous malfunctions and poor accuracy. We cleaned and lubed the pistol, but the problem remained.

Some time later he walked by my bench and put down a box of ammunition. As I picked up the box of .380, he said, "But you still have to use the right stuff."

Perhaps the ultimate indoor range command that blasts out of the PA system is, "Lane five . . . *go home*!" ●

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John Haviland

Armscor USA/Rock Island Armory has enjoyed some success the last few years chambering its .22 TCM centerfire cartridge in several versions of its autoloading handguns. It's only natural then that Armscor would chamber the .22 TCM in a rifle to take advantage of the cartridge's full potential. According to Martin Tuason, president of Rock Island Armory and Armscor Precision International, the .22 TCM rifle ". . . is a must have for hunters looking for maximum velocity and stopping power in a .22-caliber firearm." That might be stretching the cartridge's performance more than a bit, because it is essentially a shortened .223 Remington.

.22 TCM

Handloads for a Rifle

Tuason and firearms engineer Fred Craig developed the cartridge, and TCM stands for Tuason Craig Magnum. The case is a .223 Remington shortened about .73 inch with a slightly deeper extractor groove .049 inch in diameter and a thicker rim .050 inch in diameter. The neck wall thickness of TCM cases measured .015 inch. Ten .22 TCM cases weighed an average of 72.1 grains, compared to 92.0 grains for Winchester .223 cases. Armscor puts the velocity of its 40-grain jacketed hollowpoint from its Precision .22 TCM factory loads at 1,875 fps from a 5-inch pistol barrel and "over 2,800" fps from a 22.75-inch rifle barrel. Factory load pressure is about 40,000 psi.

The rifle is the first of a new line of centerfire rifles for Rock Island Armory. The model number is 22 TCM BA, but it is not shown on the rifle. Stamped on the left rear receiver wall is "APINTL-PAHRUMPNV," which stands for Armscor Precision International – Pahrump, Ne-

The Rock Island .22 TCM rifle worked well on ground squirrels. The cartridge generates next to no recoil from the 8-pound rifle.

Above, the bolt face is recessed on the Rock Island Armory .22 TCM rifle. Right, the rifle has a single locking lug located at the back of the bolt.

vada. Below that is stamped "ACP Philippines," which stands for Arms Corporation of the Philippines. On the right, the receiver is stamped "ROCK ISLAND Armory."

The action is designed for low-pressure cartridges, because its single locking lug, located at the rear of the bolt, latches into the side of the receiver wall. With the .22 TCM's mild pressure, that is probably enough of a fastener. Its recessed bolt face has a Sako-style extractor, and a case pulled from the chamber hits the head of a pin, positioned at the left rear of the ejection port, to eject the case.

The stock is a Philippine hardwood with a black forearm tip and point-pattern checkering panels on both sides of the grip and forearm. A Parkerized finish covers the metal, and the barrel is fairly heavy at .90 inch in diameter in front of the receiver, tapering to .75 inch at the muzzle. Trigger pull is four pounds. A five-round detachable magazine comes with the rifle, and the .22 TCM 17-round pistol magazine also fits in the rifle.

The grooved top of the receiver accepts clamp-on scope rings. I tried several high-magnification scopes on the rifle, but their wide ocular lens housing blocked movement of the bolt handle. A Leupold M8 4x had a narrow enough housing to clear the handle.

At the 2015 SHOT Show Media Day, folks were shooting Rock Island TCM autoloading pistols chambered in .22 TCM. Empty cases flew through the air and landed at my feet like a gift from the heavens, so I gathered up a pile of them. Armscor factory Precision .22 TCM cartridges loaded with 40-grain bullets and brass are available from www.ammosupplywarehouse.com.

At home I set about preparing the cases for reloading, but even basic reloading information was unavailable for the cartridge. Another writer has shot Armscor USA .22 TCM cartridges in a Rock Island autoloading pistol and established a 1.030-inch maximum length for cases. Redding dies were on hand for full-length sizing, and cases were trimmed to a length of 1.020 inches.

No established powder weight data is available for the .22 TCM. To develop information for suitable powders and powder weights, I searched for an established case of similar capacity. The total capacity of the .22 TCM case is similar to the .22 Hornet. In fact, TCM cases hold .4 grain more water than Prvi Partizan .22 Hornet cases. The shape of the two cases, however, is entirely different. The Hornet case is long with a slender shoulder and rim compared to the short TCM rimless case with a sharp shoulder. Hornet starting loads listed in various handloading man-

.22 TCM

The .22 TCM's short cartridge length limits suitable bullets; these three bullets fit (left to right): Nosler 40-grain HP Varmageddon, Hornady 45-grain HP Bee and Speer 46-grain Bee FNSP.

uals looked like a prudent place to begin loading the .22 TCM. There would be no hot-rodding the cartridge because of the single locking lug at the rear of the bolt.

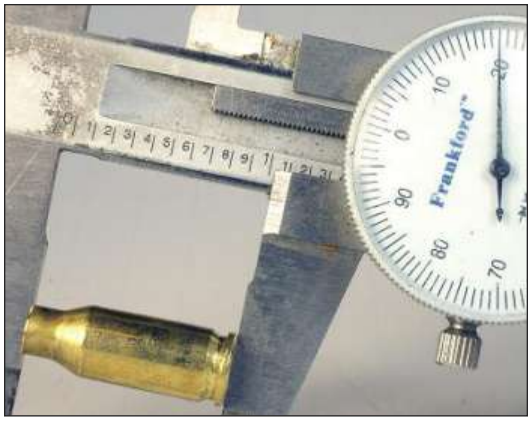
The .22 TCM is limited in its usefulness because the short cartridge length can only be loaded with lightweight and blunt-nose bullets. The rifle's magazine will accept cartridges with a maximum length

Redding makes reloading dies for the .22 TCM, and a .223 Remington shellholder fits the case.

of 1.275 inches, which is the same as the .45 ACP. That short length ruled out any bullet over 40 grains with a pointed nose. Even the nose of the Berger 30-grain Flat Base Varmint bullet is too pointed, and the full diameter of the bullet sits below the bottom of the case neck with a cartridge length of 1.275 inches. Nosler 40-grain Varmageddon hollowpoints fit, but barely. Assembled cartridges looked weird, because the bullets' ogives sit below the case mouths. The only bullets that fit correctly are designed for the .218 Bee. Bullets on hand included the Hornady 45-grain Bee hollowpoint and Speer 46-grain Bee FNSP.

The .22 TCM was loaded with powders commonly used in the .22 Hornet, such as Accurate 1680, Ramshot Enforcer, Alliant Power Pro 300-MP and 2400 and Hodgdon Lil'Gun and H-4198. Winchester 296 would also be an appropriate powder, but it has been absent from sporting goods store shelves for more than a year.

The first batch of .22 TCM cartridges were loaded with CCI Small Rifle BR4 primers. About a third of the primers failed to fire due to a light strike of the firing pin. Switching to Winchester Small



Left, the .22 TCM (left) has about the same total case capacity as the .22 Hornet (center) and is essentially a shortened .223 Remington (right). The TCM also has a deeper extractor groove and thicker rim than the .223. Above, trim length is 1.020 inches for .22 TCM cases.

Pistol primers solved the problem, and all of them fired.

The .22 TCM delivered much higher speeds with Lil'Gun than those stated for the .22 Hornet in various reloading manuals. For instance, Hornady 45-grain Bee hollowpoints turned in a velocity of 2,670 fps with 10.0 grains of Lil'Gun. The *Hornady Handbook of Cartridge Reloading 9th Edition* lists a velocity of 2,400 fps from 10.2 grains of Lil'Gun for the Hornet. Nosler 40-grain Varmageddon hollowpoints reached 2,780 fps from the .22 TCM burning 10.0 grains of Lil'Gun, but the *Nosler*

The .22 TCM cartridge must be kept to a length of 1.275 inches to fit in the magazine of the Rock Island Armory rifle.

Above, the rifle printed this group at 50 yards shooting Nosler 40-grain HP Varmageddon bullets over 10.0 grains of Hodgdon Lil'Gun powder. The group below, shot at 100 yards, used Speer 46-grain Bee FNSP bullets and Lil'Gun.

.22 TCM Handloads for Rifles

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)	group (*inches*)
40 Nosler HP Varmageddon	2400	8.8	1.275	2,215	1.03*
	A-1680	11.0		2,173	3.02, 1.42*
		12.0		2,440	–
	Enforcer	8.5		2,280	.65*
	Lil'Gun	10.0		2,780	1.25, .65*
		10.3		2,845	.34*
45 Hornady HP Bee	Power Pro 300-MP	10.3	1.275	2,551	1.55
	2400	8.0		1,956	3.08
	Lil'Gun	10.0		2,670	1.78
	H-4198	10.5		1,900	2.60
46 Speer Bee FNSP	Power Pro 300-MP	10.3	1.275	2,496	2.68
	2400	8.0		1,876	3.62
	Lil'Gun	10.0		2,644	1.83
	H-4198	10.3		1,749	1.95
		10.5		1,815	2.33

***** Groups shot at 50 yards. All others were shot at 100 yards.

Notes: All loads were assembled with Armscor Precision cases and Winchester Small Pistol primers. Cases were trimmed to a length of 1.020 inches. Velocities were recorded 10 feet in front of the Rock Island rifle's 22-inch barrel.

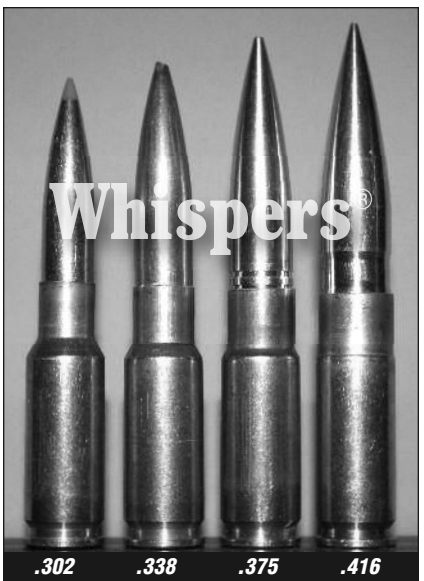
Be Alert – Publisher cannot accept responsibility for errors in published load data.

Reloading Guide 7 indicates 2,466 fps for the same bullet loaded in the Hornet with the same powder charge. Of course, different cases, primers, bullets and rifles were used for the .22 TCM and .22 Hornet loads, but a 300 fps difference between cases with nearly the same volume is significant. This shows one should proceed cautiously when developing loads by the seat of one's pants.

Other powders, like Accurate 1680 and Ramshot Enforcer, fired from the .22 TCM, though, were fairly close to the speeds listed for the .22 Hornet. Alliant 2400 produced sluggish velocities.

Lil'Gun and Power Pro 300-MP are the powders for top speeds in the .22 TCM. *The loads listed for those two powders in the accompanying table should be considered the absolute maximum for the Rock Island Armory rifle.* Bolt lift was very stiff after firing these cartridges. Cases fired with Lil'Gun and Power Pro 300-MP stretched quite a bit after one firing and being resized in the Redding full-length sizing die. They grew from 1.020 to 1.030 inches and longer.

The Rock Island Armory rifle shot adequately at 50 and 100 yards from a bench over five different days. The rifle would shoot



a nice round group one time, but bullets from the same load shot a second time would spread up or sideways a good 3 inches. The rifle definitely preferred Lil'Gun with all the bullets used and Power Pro 300-MP with Hornady 45-grain Bee bullets. A scope higher than 4x would have allowed a more precise aim and perhaps shrunk group sizes.

Even a few tenths of a grain difference in powder can cause a wide difference in velocity in a small cartridge like the .22 TCM. Nosler 40-grain Varmageddon bullets varied 65 fps between 10.0 and 10.3 grains of Lil'Gun. Speer 46-grain bullets varied 66 fps between 10.3 and 10.5 grains of H-4198.

Even though each powder charge was weighed on a balance beam scale, velocity spread was quite high with some powders. Alliant 2400 varied up to 119 fps; Power Pro 300-MP, up to 150 fps; Accurate 1680 and Lil'Gun ranged 78 fps.

This past spring my son and I shot the rifle at ground squirrels. Cartridges loaded with Nosler 40-grain Varmageddon hollowpoints cycled without a hitch from the magazine and into the chamber, even though the bullets' ogives sat below the case mouths. A gentle pull on the bolt usually left fired cases in the action. A hard pull threw them clear of the rifle. We shot out to 75 yards or so with the rifle supported on shooting sticks; we missed a few and hit a few. There was no doubt of a hit, even at the mild velocities produced with the Varmageddon bullets seated over Lil'Gun. Recoil from the load was next to nonexistent in the 8-pound rifle (with Leupold scope). With no recoil to jar the sights off the target, it was fun to see all the action.

If the rifle was mine, I would chop about 5 inches off the forearm and slim the grip to make the rifle handier. The .22 TCM was fun to shoot, and reloading cartridges was easy and straightforward. However, acceptance of the .22 TCM as a rifle cartridge will depend on other rifle companies chambering the cartridge. Cartridges smaller than the .223 Remington have not fared well. The .221 Remington Fireball is a more useful cartridge, because it can be loaded with pointed bullets and heavier bullets than the .22 TCM. The Fireball also shoots a good 500 fps faster with only a few grains more powder, but it is on its last legs. Perhaps the .22 TCM's brightest future remains as a handgun cartridge.

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Cutting Edge Handgun Bullets

Brian Pearce

A series of excellent groups at 25 yards using a Ruger New Model Blackhawk .41 Magnum (stainless steel Bisley) and carefully assembled handloads included the tightest individual group ever achieved with this sixgun. This is significant, as the revolver has been used to evaluate several prototype factory loads and develop hundreds of different handloads with a large variety of cast and jacketed bullets with hundreds of powder combinations.

The above handload consisted of Starline cases, 15.0 grains of Accurate No. 7 powder and a bullet some handloaders may have never heard of, the Cutting Edge 180-grain Handgun Raptor hollowpoint. Pushed to a muzzle velocity of just over 1,400 fps, all five shots were touching in a ragged hole and measured .62 inch center to center. Moving out to 200 yards, this load again turned in top accuracy, proving proper stabilization. Next the bullets were checked for expansion, but I am getting ahead of myself.

Cutting Edge handgun bullets are machined from solid copper and have some important design features. They are available in hollowpoint versions known as the Handgun Raptor and Handgun Solid that are available in .380, 9mm, .357, .40, .41, .44, .45 (for .45 ACP and .454 Casull), .475 and .500 S&W calibers and in multiple bullet weights.

Cutting Edge states all Raptor bullets will reliably expand at 900 fps, but in my testing, expansion was reliable at velocities as low as 800 fps with select bullets, such as the 110-grain .357 and 150-grain .45 caliber (designed specifically for the .45 ACP). Each of the

sixguns and have a tremendous amount of respect for how well solid bullets with large meplats perform. They help to create a large and long wound channel, deliver shock to the nervous system and generally exit the offside of most animals, leaving an easy blood trail. On heavy game they can break bone and still reach the vitals.

The meplat of the .357-caliber, 165-grain bullet measures around .275 inch (difficult to measure exactly as the edges are slightly rounded), the .41-caliber 220 grain measures .320 inch, while the .44-caliber 240 grain's meplat is .290 inch. Incidentally, the .357- and

Cutting Edge bullets proved accurate from a Ruger SR1911. Below, the .357-caliber, 105-grain Raptor bullet features an unusually deep hollowpoint that is precut for reliable and rapid expansion at velocities of 900 fps or more.

bullets' four petals peel back and break off, leaving the solid shank resembling a wadcutter profile to push forward for deep penetration. Interestingly, bullets recovered from ballistic gelatin looked the same when recovered at 900 fps or 1,400 fps, and expansion started almost immediately upon impact. Cutting Edge has designed these for personal protection and hunting applications, where both expansion *and* penetration are desired.

Cutting Edge Solids will find favor among those looking for a bullet to be used on big game and especially heavy game. I have taken much game with big-bore

Cutting Edge Handgun Bullets

.41-caliber bullets feature rounded ogives, while the .44 is a truncated cone design.

Cutting Edge Raptor and Solid bullets are fully machined and display outstanding precision and uniformity. Often I could weigh 10 bullets that displayed virtually no weight variance. Being constructed of solid copper, they are long when compared to a traditional cup-and-core jacketed bullet of the same weight, which can pose challenges to handloaders. For example, the increased bearing surface can make it difficult for many handgun cartridges, especially those with lower pressures or loads that contain limited powder charges, to reliably push the bullet out the barrel. This long surface can also increase pressure and almost always reduces velocities. Cutting Edge has helped minimize this problem by placing circumferential rings around the bullet's shank (similar to Barnes TSX rifle bullets), which are usually cut around .005 to .007 inch deep, depending on caliber.

In spite of Cutting Edge bullets having circumferential rings to reduce bore friction and bearing surface, rifling contacted most of the bullet's shank, as seen on this .357 Magnum 165-grain Solid.

The Raptor HP features four precut relief slots to allow expansion upon impact, which results in four petals breaking off with a solid shank (right) offering penetration.

Another feature of "long" bullets is that they seat deeper into the case (when maintaining industry overall cartridge lengths), which significantly reduces powder capacity. This has a huge effect on suitable loads and powder charges. As a result, load data developed with cup-and-core bullets that are of the same weight cannot be used interchangeably with Cutting Edge bullets. In fact, in many instances, such loads using popular ball (spherical) powders in magnum revolver cartridges were either not possible or heavily compressed, which can produce erratic pressures and is generally not advised.

Another unusual Cutting Edge bullet feature that makes developing handload data challenging is the deep-cut Raptor hollowpoints that result in very long for weight bullets. For example, when compared, the .44-caliber (.430 inch), 200-grain Raptor and the .44-caliber, 240-grain Solid share the same length of .837 inch and have identical bearing surfaces of .600 inch. Switching to .357 caliber, the 140-grain Raptor measures .839 inch long, while the 165-grain Solid measures .788, with the heavier bullet having notably less bearing surface. As a result, load data had to be specifically developed with each bullet used and was not predictable based on weight.

The guns used to develop handloads included (1) a Ruger GP100 .357 Magnum, (2) Ruger New Model Blackhawk (Bisley) .41 Magnum, (3) Ruger New Model Blackhawk (Bisley) .44 Magnum, (4) Ruger SR1911 .45 ACP and (5) Freedom Arms Model 83 .454 Casull.

The .357 Magnum data was developed using Raptor 105- and 140-grain bullets and the 165-grain Solid, with each featuring a small front driving band that measured .358 inch. Cases were roll crimped, using an RCBS die, to the bottom of the crimp groove that measures around .010 inch deep. All bullets were seated with an overall cartridge length of 1.570 inches.

There are published loads for Cutting Edge bullets in the .357, but much of this was completely unsuitable. In many instances the powder charges using slow-burning powders were too low, which caused squib loads and even stuck bullets in the bore. For these rea-

It is important to not reduce suggested "start" loads or bullets can stick in the bore, which happened several times throughout testing, and is potentially dangerous.

sons, loads for the .357 Magnum, as well as all cartridges included here, should not be reduced below the "start" loads.

I did manage to develop data using traditional magnum revolver powders, including Alliant 2400, Ramshot Enforcer and Accurate No. 9, that was consistent, accurate and within industry pressure limits at 35,000 psi. Nonetheless, select faster-burning powders produced higher velocities and top-notch accuracy. For example, 9.5 and 10.0 grains of Alliant Power Pistol reached 1,509 and 1,565 fps, respectively, using the 105-grain Raptor bullet, while 10.5 grains of Hodgdon Longshot reached 1,544 fps and consistently kept five shots inside .75 to 1.0 inch at 25 yards when fired from the Ruger GP100 test gun.

Moving up to the 140-grain Raptor bullet, notable performance was achieved using Accurate No. 9 and Vihtavuori N105 powders, with both loads reaching over 1,400 fps. The 165-grain Solid was tried with several powders, but the best performers included Alliant 2400, Hodgdon H-110 and Longshot.

Three bullets were tested in the .41 Magnum: the 135- and 180-grain Raptors and 220-grain Solid. Cases were roll crimped into the bottom of the .010 inch deep crimp groove, which when combined with the strength of Starline cases, gave plenty of bullet pull to achieve reliable ignition and to prevent bullets from jumping crimp.

I generally don't favor light-for-caliber bullets in sixguns, but the 135-grain Raptor was impressive, as it reached over 1,700 fps using Power Pistol and Longshot powders. Although it was not quite as accurate as the 180-grain version, it still produced several groups that measured around one inch at 25 yards.

As previously indicated, the 180-

Table I

.357 Magnum Handloads

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)	comments
105 Cutting Edge Raptor HP	Power Pistol	8.5	1.570	1,384	
		9.0		1,433	
		9.5		1,509	
		10.0		1,565	
	A-7	11.0		1,317	
		12.0		1,351	
		13.0		1,399	
	2400	13.2		1,078	
		13.7		1,147	
		14.2		1,202	
		15.0		1,317	
		15.5		1,388	
		16.0		1,485	
	Enforcer	14.5		1,099	
		15.0		1,184	
		15.5		1,264	
		16.0		1,307	
		16.5		1,362	
	A-9	13.5		1,218	
		14.0		1,259	
		14.5		1,310	
		15.0		1,399	
		15.5		1,465	
	Longshot	9.0		1,421	
		9.5		1,455	
		10.0		1,491	
		10.5		1,544	
		11.0		1,578	
140 Cutting Edge Raptor HP	VV-N105	9.5	1.570	1,020	
		10.0		1,091	
		10.5		1,195	
		11.0		1,275	
		11.5		1,330	
		12.0		1,401	
	A-9	13.0		1,215	
		14.0		1,356	
		14.8		1,437	maximum
	A-7	11.7		1,338	
165 Cutting Edge Solid	H-110	15.5 *	1.570	1,076	do not reduce
		16.0 *		1,162	
	2400	12.5		1,022	do not reduce
		13.0		1,070	
		13.5		1,113	
		14.0		1,171	
	Longshot	8.0		1,034	
		9.0		1,160	

* CCI 550 primers were used for these two loads only.

Notes: A Ruger GP100 with a 6-inch barrel was used to test-fire the loads. Starline cases and CCI 500 primers were used throughout, except where noted by an asterisk (*). Bullet diameter: .357 inch; maximum case length: 1.290 inches; trim-to length: 1.280 inches.

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grain Raptor gave outstanding accuracy with several powders, including Accurate No. 7, Alliant 2400, Power Pistol and Hodgdon Longshot. It was generally pushed to around 1,400 fps and should prove capable of most tasks from defense to hunting deer, making it a great all-purpose bullet. Incidentally, the recovered shank from ballistic gelatin, which was void of the four precut, hollowpoint's petals, weighed 134 grains.

The 220-grain Solid easily reached 1,250 fps and is an outstanding choice for hunting large, heavy game where deep penetration is important. Accurate No. 7 and Alliant 2400 gave the best accuracy.

Table II

.41 Magnum Handloads

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)	comments
135 Cutting Edge Raptor HP	Power Pistol	13.0	1.588	1,635	
		13.5		1,666	
		14.0		1,719	
		14.5		1,750	
	A-9	19.0		1,565	
		19.5		1,570	
		20.0		1,591	
		20.5		1,596	
	Longshot	13.5		1,702	
		14.0		1,721	
180 Cutting Edge Raptor HP	A-7	13.0		1,232	
		13.5		1,271	
		14.0		1,321	
		14.5		1,381	
		15.0		1,424	
	2400	15.0		1,143	do not reduce
		16.0		1,242	
		17.0		1,322	
	Enforcer	16.5		1,165	
		17.0		1,211	
		17.5		1,283	
		18.0		1,327	
	Longshot	11.0		1,352	
		11.5		1,371	
		12.0		1,381	
		12.5		1,403	
	Power Pistol	10.0		1,246	
		10.5		1,281	
		11.0		1,342	
		11.5		1,377	
220 Cutting Edge Solid	H-110	18.0 *	1.588	1,063	
		19.0 *		1,151	
		20.0 *		1,246	
	2400	16.0		1,066	
		16.5		1,145	
		17.0		1,215	
		17.5		1,276	
	Power Pistol	9.5		1,047	
		10.0		1,079	
		10.5		1,156	
		11.1		1,201	
	A-7	13.0		1,083	
		13.5		1,121	
		14.0		1,202	
		14.5		1,248	
	Enforcer	16.0		1,104	do not reduce
		16.5		1,121	
		17.0		1,162	
		17.5		1,180	

* CCI 350 primers used for these three loads only.

Notes: A Ruger New Model Blackhawk (stainless Bisley) with a 5½-inch barrel was used to test-fire these loads. Starline cases were used throughout. CCI 300 primers were used in all loads except those indicated by an asterisk (*). Bullet diameter: .410 inch; maximum case length: 1.290 inches; trim-to length: 1.280 inches..

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The 200-grain, .44-caliber Raptor could be pushed 1,500 fps in the .44 Remington Magnum using 21.0 grains of Accurate No. 9 in the Ruger New Model Blackhawk Bisley with a 5½-inch barrel. It appears to be a credible load for hunting deer and similar game. When loaded down to around 1,250 fps using 11.0 grains of Power Pistol or 11.5 grains of Longshot powder, recoil was comparatively mild and allowed for fast double-action work from a Smith & Wesson Model 629 Mountain Gun, which opens up its use for personal defense possibilities. Virtually all loads listed were accurate, with most groups hovering around one inch at 25 yards. The solid shank, with the petals broken off from expansion, weighed 147 grains.

Table III

.44 Magnum Handloads

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)
200 Cutting Edge Raptor HP	Power Pistol	11.0	1.610	1,254
		11.5		1,282
		12.0		1,317
		12.5		1,369
		13.0		1,409
		13.5		1,441
	A-9	19.0		1,337
		20.0		1,406
		21.0		1,499
	2400	19.0		1,368
		20.0		1,409
		21.0		1,479
	Longshot	11.5		1,275
		12.0		1,300
		12.5		1,339
		13.0		1,371
		13.5		1,394
240 Cutting Edge Solid	A-9	17.0	1.610	1,131
		17.5		1,166
		18.0		1,222
		18.5		1,269
		19.0		1,305
	H-110	21.0 *		1,195
		22.0 *		1,240
		23.0 *		1,310
	2400	16.0		1,012
		17.0		1,090
		18.0		1,196
		19.0		1,274
	VV-N105	14.0		1,114
		14.5		1,155
		15.0		1,231
		15.5		1,278
	Longshot	12.0		1,202
		12.5		1,203
		13.0		1,237
		13.5		1,255
	Power Pistol	11.0		1,128
		11.5		1,160
		12.0		1,213
		12.5		1,244

* CCI 350 pimers were used for these three loads only.

Notes: A Ruger New Model Blackhawk (stainless Bisley) with a 5½-inch barrel was used to test-fire these loads. Starline cases were used throughout. CCI 300 primers were used in all loads, except those indicated with an asterisk (*). Bullet diameter: .430 inch; maximum case length: 1.285 inches; trim-to length: 1.275 inches.

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Table IV .45 ACP +P (23,000 psi) Handloads

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)
150 Cutting Edge Raptor HP	Power Pistol	7.5	1.215	983
		8.0		1,044
		8.5		1,129
		9.0		1,190
		9.2		1,203
	Longshot	9.0		1,231
		9.2		1,266
	A-7	10.5		974
		11.0		1,013
		11.5		1,071
		12.0		1,119
		12.3		1,157
	Unique	6.5		1,018
		7.0		1,079
		7.5		1,164
		8.0		1,233
	Bullseye	5.5		942
		6.0		1,014
		6.5		1,095
	A-5	8.5		928
		9.0		981
		9.5		1,063
		10.0		1,116

Notes: A Ruger SR1911 with a 5-inch barrel was used to test-fire these loads. Starline cases and Remington 2½ Large Pistol primers were used throughout. Bullet diameter: .451/.452 inch; maximum case length: .898 inch; trim-to length: .893 inch.

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The 240-grain Solid could be pushed around 1,300 fps with most powders, but No. 9, 2400 and VV-N105 gave top accuracy. This bullet is certain to find favor among Alaskan guides and handgun hunters looking for reliable penetration on heavy game. The .44 Magnum cases were also roll crimped to the bottom of the crimp groove, which resulted in enough bullet pull to prevent their jumping crimp and helped achieve uniform powder ignition.

The .45-caliber, 150-grain Raptor was designed specifically for the .45 ACP (aka, .45 Auto) cartridge. After seating bullets to an overall cartridge length of 1.215 inches, as a separate step, they were taper-crimped in place, with the case mouth measuring .470 inch for proper headspace control in guns with correct chamber dimensions.

Using 6.0 grains of Alliant Bullseye powder, velocity was 1,014 fps, which produced the single tightest group, but most loads yielded similar accuracy. Hodgdon Longshot, Alliant Power Pistol and Unique each reached over 1,200 fps and are listed as +P loads with pressures currently established at 23,000 psi.

The 150-grain Raptor expands at just 800 fps, and with petals broken off, the shank weighs around 85 grains. When pushed just over 900 fps, a Ruger SR1911 pistol functioned reliably, and recoil was comparatively modest. Such loads may prove especially interesting for the recoil sensitive wanting an effective defense load.

The only bullet tried in the .454 Casull was the 240-grain Raptor, but a 300-grain Solid is produced by Cutting Edge that should be of special interest to big-game hunters. Unfortunately, I had no

Table V

.454 Casull Handloads

bullet (*grains*)	powder	charge (*grains*)	overall loaded length (*inches*)	velocity (*fps*)
240 Cutting Edge Raptor HP	2400	23.0	1.748	1,390
		24.0		1,430
		25.0		1,501
	H-110	26.0		1,258
		27.0		1,344
		28.0		1,474
		29.0		1,582
		30.0		1,671
	A-9	23.0		1,448
		24.0		1,502
		25.0		1,582
		26.0		1,637
	A-7	21.5		1,568
		22.0		1,577
		22.5		1,618
		23.0		1,653
		23.5		1,675
	Enforcer	25.0		1,478
		26.0		1,511
		27.0		1,566
		28.0		1,614
	Power Pistol	17.0		1,535
		17.5		1,542
		18.0		1,569
		18.5		1,579
	Longshot	18.0		1,538
		19.0		1,553
		20.0		1,588

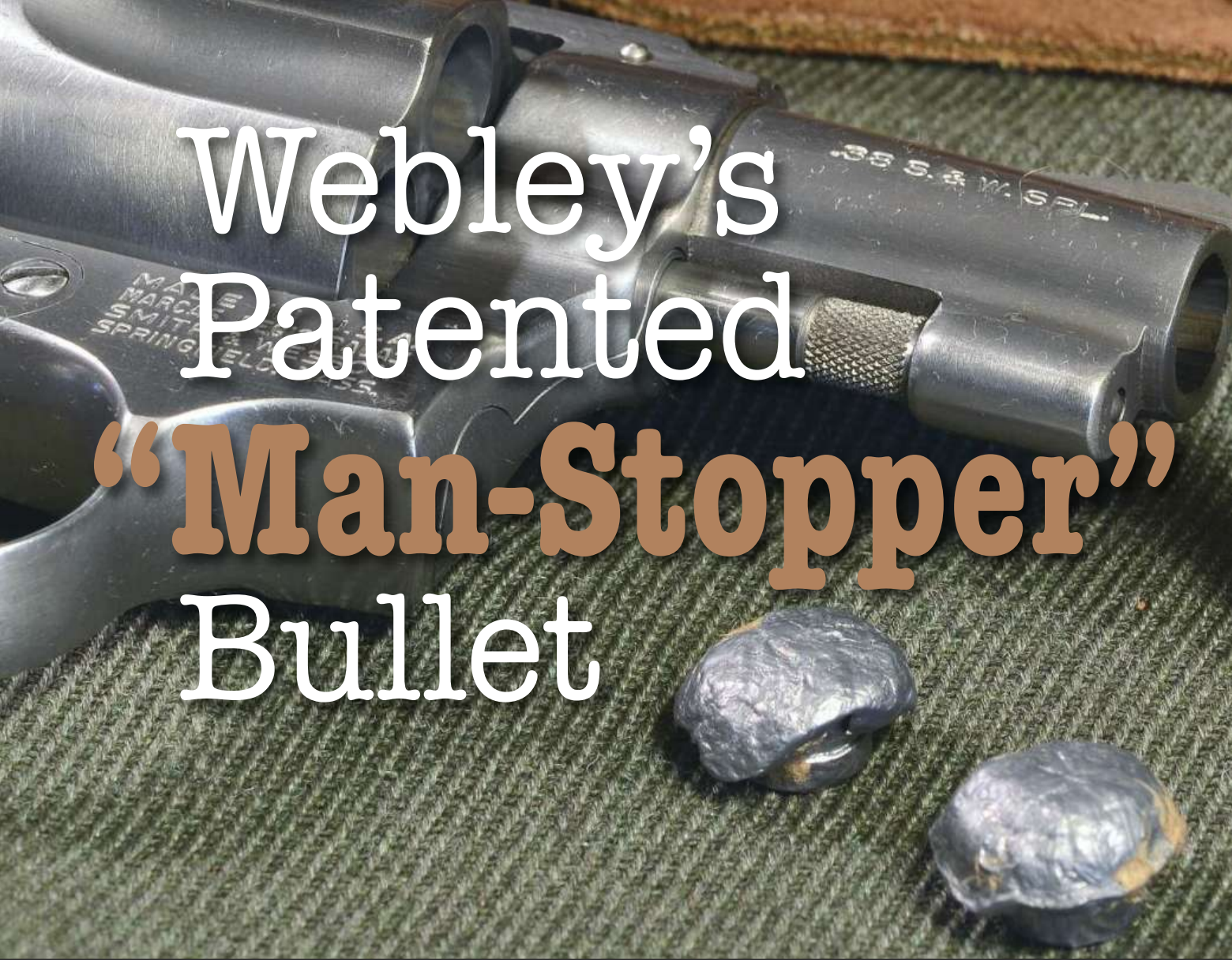
Notes: A Freedom Arms Model 83 with a 7½-inch barrel was used to test-fire the above loads. Starline cases and Remington 7½ Small Rifle primers were used throughout. Bullet diameter: .452 inch; maximum case length: 1.383 inches; trim-to length: 1.373 inches.

Be Alert – Publisher cannot accept responsibility for errors in published load data.

samples. The 240-grain Raptor performed well and produced its best accuracy with highest velocity loads, such as 30.0 grains of Hodgdon H-110, 23.5 grains of Accurate No. 7 or 26.0 grains of Accurate No. 9, which were approaching 1,700 fps from a Freedom Arms Model 83 revolver with a 7½-inch barrel. When fired into ballistic gelatin at around 1,700 fps, the recovered bullet shank weighed just over 182 grains.

The .454 Casull requires a heavy crimp to prevent bullets from jumping crimp when subjected to recoil. An RCBS roll crimp die that produces the standard radius-style crimp worked fine. However, to develop the accompanying handload data, an RCBS crimp die that produces a chamfer-style "neck-down" crimp was used.

Some of the "start" loads may not be suitable for use in rifles, and it is strongly suggested to not reduce starting loads, or pressures may not be adequate to keep bullets from sticking in the bore. Overall I was impressed with Cutting Edge bullet designs, quality, performance and accuracy. ●



Webley's Patented "Man-Stopper" Bullet

Terry Wieland

While Rocky Marciano was a heavyweight boxing champion, there was a lot of speculation about exactly how powerful his punch was. Various researchers developed methods of measuring punching power. They calculated that an uppercut that would lift a heavyweight off his feet required 700 foot-pounds (ft-lbs) of energy. In tests using a ballistic pendulum at a military facility, wearing a 12-ounce glove, Marciano's right – the old Suzi-Q – was measured at 925 ft-lbs.

Think about that. The standard .45 Auto military hardball load (230-grain FMJ, 855 fps) generates 405 ft-lbs. You don't get to 700 ft-lbs until the lower rungs of .44 Remington Magnum factory loads (210-grain JHP, 1,250 fps, 729 ft-lbs), and it takes a hot .44 to hit 925 (200-grain JHP, 1,450 fps, 934 ft-lbs).

No one is suggesting that absorbing a solid right from Marciano is the equal of getting hit in the chest by a .44 Magnum, but – and it is a very important *but* – in terms of stopping power, they are very comparable. Take a right from The Rock anywhere in the body, and you will stop whatever it was you were doing. Same with the .44 Magnum.

The essential consideration here is not lethality but stopping power. When discussing handgun loads for self-defense, what counts is stopping power not killing power.

Another important consideration is the fact that Marciano's fist hit his opponent and stopped, delivering virtually all its energy to his body. A small, nonexpanding bullet at high velocity, such as the 9mm Luger,

Considerations for Carry Guns

Left, getting a good self-defense load in a snub-nosed .38 Special can be difficult. Bob Hayley's 140-grain version of the Webley "Man-Stopper" delivers excellent expansion at velocities attainable in a short barrel. Above (left to right): modern .45-caliber "Man-Stopper," .455 Colt Mk. I, .455 Colt Mk. II, early .45 Colt factory load and the .45 Colt loaded with the "Man-Stopper" bullet.

could hit in the middle of a body but zip through, delivering neither great energy on impact nor immediate organ damage. Your assailant might die eventually, but you might well die first.

Serious study of stopping power and wound ballistics began in 1900, after American encounters with Moro tribesmen in the Philippines. The army sidearm was the .38 Long Colt, and it displayed an alarming lack of stopping power. After considerable research, the army adopted the Colt 1911 .45 Auto. No one, to this day and through a half-dozen wars, has ever complained about its stopping power.

All this would be of academic interest if we could all carry .45 Autos or .44 Remington Magnums, but this is rarely practical for concealed carry. Right here, it should be pointed out that the purpose of a concealed-carry gun is to get you out of trouble. Sometimes just showing the gun will cause a villain to back away; knowing you're armed and serious, few thugs are likely to follow you. There are exceptions, obviously.

The other major point is that, acting in self-defense, the purpose is not to kill an assailant, it's to stop him from doing whatever he's doing. This is the opposite of hunting. With dangerous game like Cape buffalo, the primary aim is to kill the animal. You may then find yourself having to stop a charge, but that's another matter. You may think this is getting into legalities better argued in court and trot out the "judged by 12 rather than carried by 6" argument. The point is that the best pistol/cartridge combination for killing an assailant may not be the best one for stopping him.

In his classic *African Rifles and Cartridges*, John Taylor praised the old, soft, pure-lead bullets from large-caliber rifles as tremendous game-getters. Not only did they expand readily, but pure lead is very elastic, not brittle like lead alloys. Pure lead forms beautiful mushrooms, and this wider surface area delivers a heck of a punch. It transfers all its energy to the target, not unlike a boxing glove on the hand of a heavyweight.

Researchers into stopping power after 1900 came to the same conclusion. Military ballisticians were interested in effective differences between the new, small-bore bullets used in smokeless powder cartridges and big, lead slugs from rifles like the Martini-Henry. They extended their research to handguns as well.

The British Army used the Webley revolver cham-

"Man-Stopper" Bullet

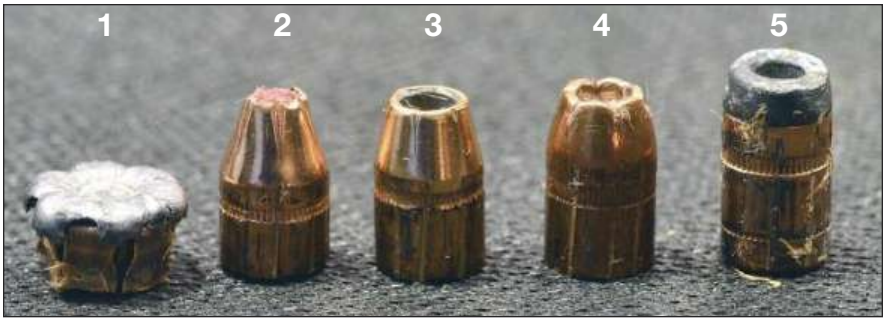
bered in .455. The bullet was 265 grains, pure lead, with a long, tapering roundnose. Muzzle velocity was 600 fps, for 220 ft-lbs of energy. Like the Americans in the Philippines, they found it lacked effectiveness against wild tribesmen. In 1898, T.W. Webley designed and patented a bullet for the .455 Colt cartridge that came to be known as the "Man-Stopper" in the British War Office. It was a 218-grain .45 loaded in Webley .455 Mk. III ammunition. The Mk. III was in use for only a couple of years. It was judged to be in contravention of the Hague Convention of 1899 prohibiting expanding bullets for military use and was removed from service in 1902.

Bullet companies have expended huge amounts of money and effort in recent years to develop serious self-defense bullets, for both factory ammunition and reloading. They are almost all jacketed hollowpoints. On ballistic gelatin, at recommended velocities, they behave admirably. There are, however, a few problems. If the necessary velocity is not attained, some do not expand at all; others misbehave on impact with different fabrics, like leather or thick wool.

Bob Hayley, the Seymour, Texas, custom bullet-caster, in response to requests from clients, set out to find a cast bullet that would perform in pistols for which suitable factory self-defense rounds were not available. Delving into history, he commissioned a mould-maker to produce moulds for the old British "Man-Stopper," in the original .45 (but slightly heavier at 230 grains) and also in .38 (140 grains).

The latter is particularly interesting because, while the .38 Special is, in many ways, an ideal carry-gun cartridge, its performance varies from gun to gun. Today, .38 Special ammunition is available in both standard and +P loads with excellent JHP bullets. The problem is that small, short-barreled revolvers like the Smith & Wesson J-frame may not generate the velocity necessary for the bullet to expand properly. Chronograph tests of factory ammunition from these guns prove they often fall far short of the velocities listed. It is up to handloaders to load ammunition using suitable powders to get something approaching useful velocities. Even then, they may produce spotty terminal results with JHP bullets. The purpose here was to develop a load for a snubby.

With such a short barrel, one of the best powders in the .38 is also the oldest: Alliant Bullseye. The goal was to reach a velocity that gave good expansion with the



Factory .38 Special loads fired from the 2-inch barreled S&W Model 60 fell far short of published velocities, and four did not expand at all: (1) Hornady Critical Defense Lite *90-grain FTX, (2) Hornady Critical Defense 110 FTX, (3) Federal Hydra-Shok Personal Defense Low Recoil 110 JHP, (4) Winchester Train & Defend 130 JHP and (5) Magtech 158 SJHP.*

Table I **Webley "Man-Stopper" Penetration Results**

cartridge (*grains*)	powder	charge (*grains*)	velocity (*fps*)	extreme spread (*fps*)	penetration (*inches*)	expansion (*grains*)	retained weight
140 .38 Special	Bullseye	3.5	772	7	13.0	almost none	140
		3.7	808	51	8.5	.595	115
		3.9	822	27	8.5	.600	135
230 .45 Colt	Unique	6.0	590	72	10.5	negligible	230
		6.5	656	74	7.5	.807	228
		7.0	727	91	8.0	.800	227

Be Alert – Publisher cannot accept responsibility for errors in published load data.

Left, Hayley's 140-grain, .38-caliber bullet is patterned after a Webley bullet from 1898 and is designed to deliver optimum expansion, even at lower velocities. Below, .38-caliber bullets: (1) unfired, (2) shot at insufficient velocity, (3) shot at borderline velocity and (4) at optimum velocity.

Fired into penetration boxes for control purposes, Federal 9mm 147-grain Hydra-Shok Tactical from a 4-inch barreled Walther P-38 penetrated 9 inches and retained 146 grains of weight. Since this is typical performance for this ammunition, it indicates the boxes and methods used are a valid test.

Table II

.38 Special Factory Load Penetration Results

bullet (*grains*)	published velocity (*fps*)	measured velocity (*fps*)	extreme spread (*fps*)	difference (*fps*)	penetration (*inches*)	expansion (*inch*)
90 Hornady Critical Defense Lite FTX	1,200	960*	25	240	8.5	.524
110 Federal Low Recoil Hydra-Shok	980	869	23	111	16+	none
110 Hornady Critical Defense FTX	1,010	896	12	114	17+	none
130 Winchester Train & Defend JHP	900	772	18	128	18+	none
158 Magtech 38E SJHP	807	772*	31	35	16+	none

***** 4-inch barrel

Notes: All published and measured velocities were fired from a 2-inch barrel, except where noted with an asterisk (*).

"Man-Stopper" but not exceed it. We were looking for a balance of genuine stopping power with manageable recoil for follow-up shots and without reaching +P pressures. In the past, I have done that using an inverted hollowbase wadcutter. This worked well enough, but that bullet is, if anything, too soft, and its skirts are too thin. It reached optimal expansion well short of maximum velocity. A tougher bullet at higher velocity but with the same expansion is a better option.

At the same time, the .45-caliber, Webley-style bullet was tested in a conventional Colt New Frontier with a 5.5-inch barrel. There are no particular problems associated with that combination, but it provided another basis for comparison.

Table I shows the performance of the different loads. Starting with

3.5 grains of Bullseye, the 140-grain bullet achieved 772 fps but failed to expand appreciably in the penetration box. Upping the charge to 3.7 grains gave an additional 35 fps, and the bullet expanded into a perfect mushroom. Recoil was moderate with both loads.

As can be seen, however, the difference in average velocity between no expansion and perfect expansion was about the same as the extreme spread of the more powerful load. The powder charge was increased to 3.9 grains, and this delivered an average velocity of 822 fps, with an extreme spread of only 27 fps – and a beautiful mushroom.

For comparison sake, I also took five factory self-defense rounds, chosen more or less at random, looking for a variety of loads that might logically be chosen for a short-barreled J-frame. All but one fell far short of advertised velocities, which were usually achieved with a 4-inch barrel as opposed to the J-frame's 2-inch barrel. When fired into the penetration box, only one expanded at all. This was Hornady's Critical Defense *Lite*, a high-velocity load with a 90-grain hollowpoint bullet. Although its velocity was 240 fps lower with the short barrel, it still expanded beautifully. Every one of the other bullets could have been reloaded and shot again.

The 230-grain, .45-caliber "Man-Stopper" performed well consistently at velocities around 700 fps. My only complaint about the loads used is the extreme spread. This reached 91 fps, which offends my sense of order. For future development, I would try different powders, such as Titegroup or CFE Pistol.

Although not included in the tables, as a test of the penetration boxes themselves (clay-target boxes packed tightly with corrugated cardboard dividers, saturated with water), I also fired two shots from a Walther P-38. With a 4-inch barrel, it delivers velocity as advertised with Federal 147-

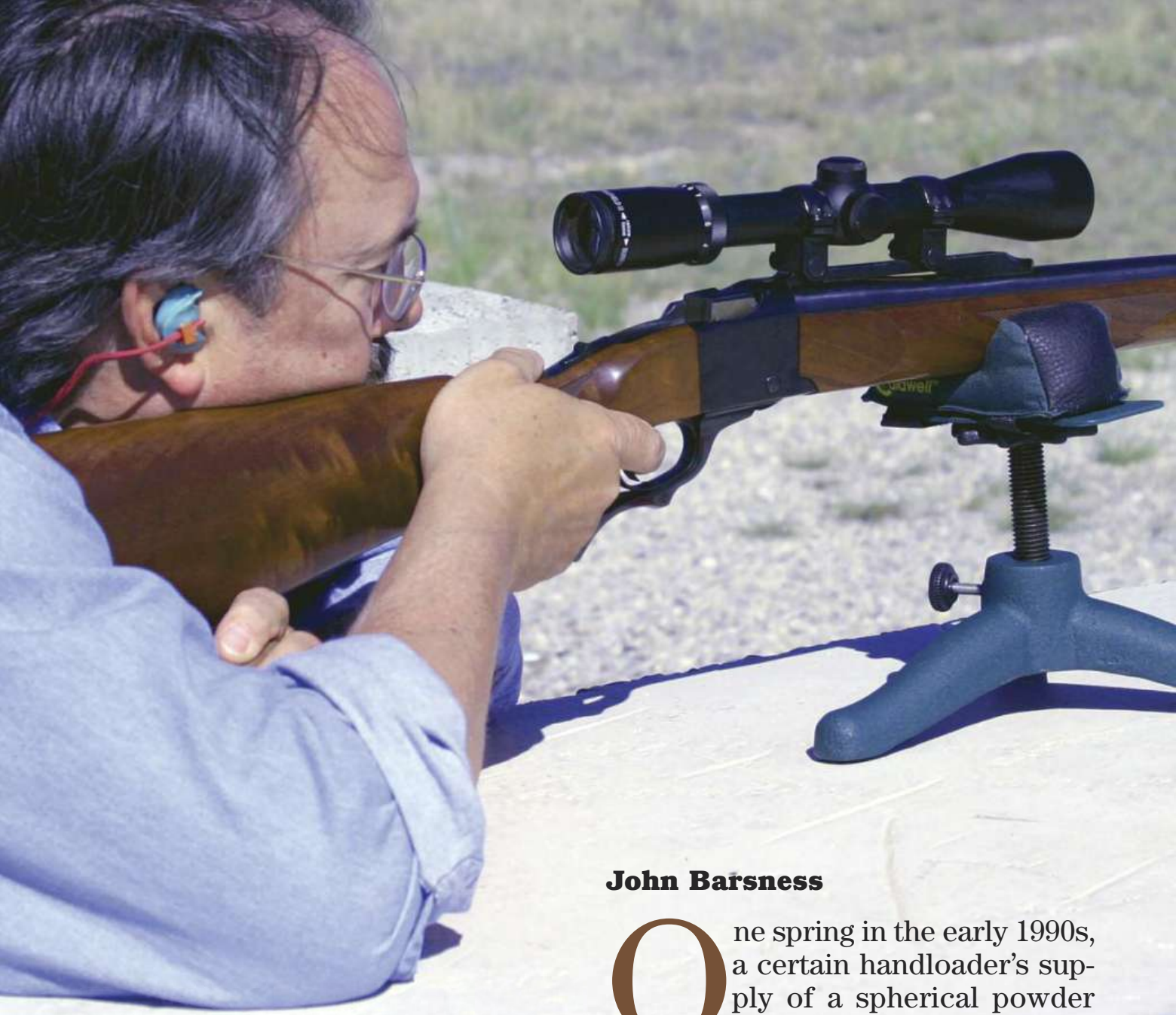
The two 230-grain, .45-caliber bullets at right were fired at sufficient velocities from a Colt New Frontier with a 5.5-inch barrel. The bottom left bullet is a result of insufficient velocity.

grain Hydra-Shok *Tactical* JHP ammunition (990 fps). Both bullets penetrated 9 inches, expanded perfectly and weighed 146 grains when recovered.

In the past, I have used soaked newsprint packed into 4-foot plywood boxes. In comparison tests with identical loads fired into those boxes, and into Cape buffalo, I concluded that soaked newsprint provides a reasonable facsimile for bullet-testing purposes. Comparing bullets from those boxes, and from the saturated cardboard used in this test, I believe *for comparison purposes between bullets*, they provide a valid result.

In the S&W Model 60 with a 2-inch barrel, it is easy to get consistent 800+ fps with the 140-grain "Man-Stopper," with excellent expansion and penetration and only moderate recoil. Of the factory self-defense loads tested, the only one I would use in that gun is the Hornady Critical Defense *Lite*. Hayley's .45-caliber bullet performed beautifully at 700 fps, and in a Colt New Frontier with a 5.5-inch barrel, recoil was no problem.

The final test – admittedly not one that can be scientifically measured – was on heavy steel "pop-up" targets. Where factory jacketed bullets from the .38 failed to knock them down, the 140-grain "Man-Stopper" knocked them down consistently. This may be attributable to its ready flattening qualities, allowing a longer "dwell" time against the plate. Long-range, steel-plate shooters know how this works. For that matter, so did Rocky Marciano. ●

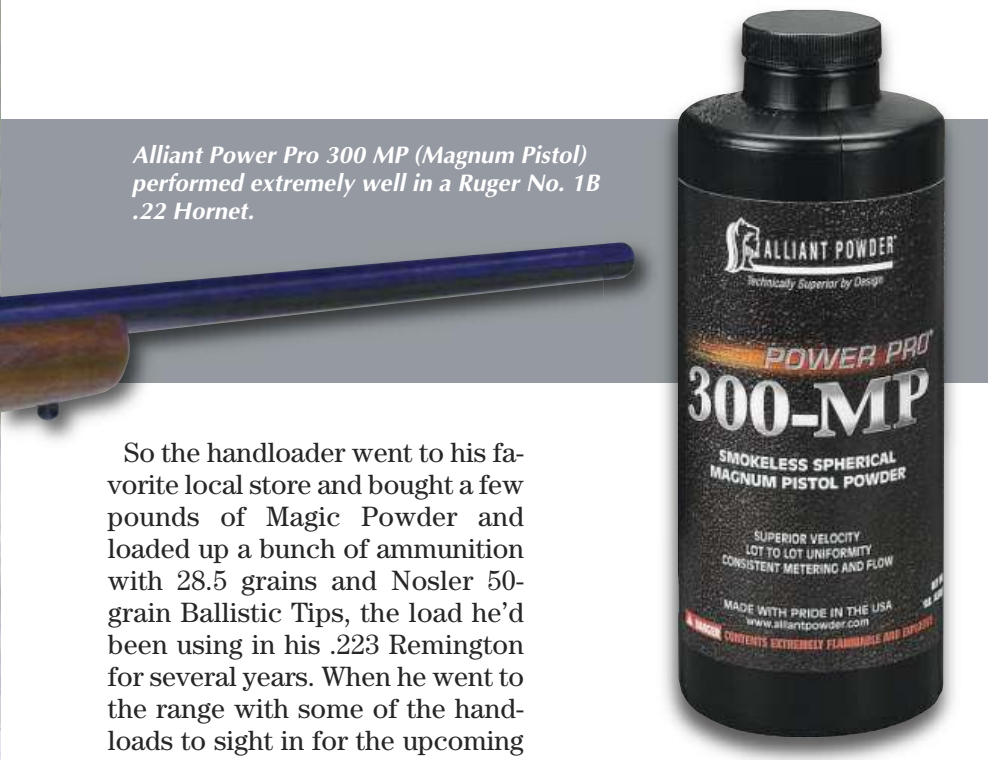


Testing Lot-to-Lot Variances

John Barsness

One spring in the early 1990s, a certain handloader's supply of a spherical powder started running low. At the time this powder was so popular for the .223 Remington – the most handloaded cartridge in America – that when prairie dog hunters asked other prairie dog hunters for their .223 recipe, the answer was often "twenty-eight grains with a fifty," because so many used this Magic Powder.

Different Batches,



Alliant Power Pro 300 MP (Magnum Pistol) performed extremely well in a Ruger No. 1B .22 Hornet.

"Same" Powder

So the handloader went to his favorite local store and bought a few pounds of Magic Powder and loaded up a bunch of ammunition with 28.5 grains and Nosler 50-grain Ballistic Tips, the load he'd been using in his .223 Remington for several years. When he went to the range with some of the handloads to sight in for the upcoming prairie dog season, his chronograph showed over 3,700 fps, more like the .22-250 Remington than the .223 Remington.

He thought this was a glitch in the light screens, but another couple of shots showed velocities in the same range. He thought maybe the chronograph's battery was low until he noticed a black smudge around one of the primers. Only then (*duh!*) did he realize the new batch of powder was a ***lot*** hotter.

Back in the loading room, all the bullets were pulled from the remaining handloads, and he did some calculating, reloading them with much lower charges. It turned out 26.5 grains of powder matched the velocity and accuracy of his loads with the previous batch of powder, a difference of 7.5 percent in the powder charge.

Of course, I knew powder could vary from lot to lot but had never experienced anything like this before. The few powder companies admitting their powder varied usually mentioned a possible difference of 2 to 3 percent from one batch to another. The mystery wasn't solved until a decade later, after I started writing regularly for gun magazines and mentioned the incident with the Magic .223 Powder in one of my articles.

Soon the head ballistician at the powder company called, saying the reason for the variation was the company finally running out of a huge batch of military surplus powder they'd been selling for decades. The powder purchased at my local store turned out to be newly manufactured powder that supposedly matched the old stuff in burn rate – but didn't.

Most significant differences in lot-to-lot burn rate are due to similar switches by powder manufacturers. When in the 1970s Hodgdon ran out of the old military-surplus H-4831, produced by DuPont for 20mm cannon ammunition during World War II, it contracted with a powder manufacturer in Scotland to produce more. The new stuff turned out to be somewhat faster burning. About the same time, DuPont IMR-4831 appeared, which was even faster burning than the H-4831 made in Scotland. The pages of shooting magazines regularly ran articles warning handloaders about the "hotter" new 4831s.

Even when powder is made in the same plant, however, it's apparently impossible to make smokeless powder exactly the same from batch to batch, due to variations in ambient humidity and the organic compounds composing most of the powder. Only rarely, however, do powder companies release manufacturing lots differing significantly from past lots. If a new batch differs considerably, it's blended with faster or slower powder from older lots to produce a consistent "canister" powder for handloaders.

Powders used by ammunition companies, on the other hand, are usually – though not always – unblended so can vary considerably. This powder normally comes in barrels the size of oil drums with labels most handloaders wouldn't recognize. New batches are tested in the ammunition maker's ballistics lab to determine what powder charge produces the results desired in pressure, velocity and accuracy.

In early 2015, I was performing a periodic inventory of my rifle powder supply, partly because The Great Obama Shortage of reloading components had caused some difficulties. When gun writers get low on powder and can't find any locally, they normally call the specific powder company and have

Left, two lots of IMR-4451 performed a little differently, but IMR-7977 was very consistent. Right, a big can of IMR-4227 that has been around a while didn't perform very differently than a new pound purchased in 2015. The two lots of IMR-4227 were made in the same Canadian factory, even though the IMR Powder Company changed hands in between.

Different Batches, "Same" Powder

some more shipped, but even many powder companies simply didn't have any, because powder companies usually don't actually make powder. Instead they buy surplus powder or contract with factories to make it. Since some powder companies had difficulty obtaining more powder from their regular manufacturers (factories can only produce so much, so mainly make the most popular stuff), they contracted with other powder manufacturers, apparently not so busy, to make new powders.

As a result, my supply was renewed in any way possible short of theft. I stalked Internet sites and local stores regularly, buying powder needed whenever it showed up but also acquired some through trades or at yard or estate sales. Toward the end of 2014, Hodgdon sent some of the new IMR Enduron powder to test, and it worked so well I bought a bunch more before anybody else found out about it and bought up the supply.

Therefore, I'd ended up with different manufacturing lots of several powders, including an unopened can of the old military surplus H-4831. There's a surprising amount of this still around, partly because so much was made. Apparently, during the peak of World War II, DuPont's powder plant was producing up to a million pounds of rifle powder a *day*, much of it the stuff Bruce Hodgdon started selling after the war as H-110, H-4895 and H-4831. (Yes, H-110 started out as a "rifle" powder for the .30 Carbine round, not as a handgun powder.) I also ended up with different lots of two of the Enduron powders, made at the General Dynamics plant in Quebec that also makes other IMR extruded powders. Some of the IMR powders on hand were old enough to come in metal cans, rather than the plastic canisters that have been used for several years now, indicating a considerable difference in age, even though all were labeled "Made in Canada."

It finally occurred to me this stash of varied powder might produce some interesting ballistic tests, not only of how much powder can vary from lot to lot but also how the original H-4831 compares with today's, an Australian-made version Hodgdon calls Extreme due to its temperature resistance.

In addition, rumors constantly float around the handloading community about how certain powders from various companies are actually exactly the same powder under different names. Hodgdon confirmed some of this when it acquired the rights to the Winchester powders a few years ago. While many handloading manuals list different data for Hodgdon H-110 and Winchester 296, Hodgdon now lists exactly the same data for both powders, because they are the same. The only reason data in other manuals varies a little is because of, once again, differences in manufacturing lots.

Similarly, the Hodgdon Extreme powders are sold in Australia under their original designations, mostly numbers instead of catchy names like Varget and Retumbo. Down Under, the powder Americans know as Hodgdon H-4831SC is AR-2213SC.

One long-time rumor is that many

of the Alliant Reloder series of rifle powders and Norma rifle powders are exactly the same, since they come out of the same Bofors factory in Sweden. One Internet site even included a list supposedly revealing exactly which Reloder powders were which Norma powders. Since I also happened to have a bunch of new Norma powder on hand, along with the normal selection of Reloder powders, some research and testing might be in order there as well.

The appearance of powders was also compared. Alliant Reloder 22 (right) and Norma MRP (left) not only performed extremely similarly but also looked identical.

Lot-to-Lot Powder Comparisons

bullet (*grains*)	powder	charge (*grains*)	primer	case	overall loaded length (*inches*)	muzzle velocity (*fps*)	100-yard group (*inches*)
.17 Hornet, CZ Model 527, 22-inch barrel, 1-in-9-inch twist:							
20 Nosler Varmint HP	A-1680 lot 1	12.0	Remington 7½	Hornady	1.629	3,628	.43
	A-1680 lot 2	12.0				3,612	.62
	A-1680 lot 3	12.0				3,621	.55
25 Hornady V-MAX	N-200	10.8			1.735	2,944	.51
	RL-7	10.8				3,076	.59
.204 Ruger, Remington 700, 24-inch barrel, 1-in-12-inch twist:							
32 Nosler Ballistic Tip	TAC lot 1	29.0	CCI 450	Remington	2.242	3,959	.65
	TAC lot 2					3,983	.72
40 Hornady V-MAX	H-4895 lot 1	27.5			2.259	3,827	.88
	H-4895 lot 2	27.5				3,811	1.38
	H-4895 lot 3	27.5				3,806	.76
.22 Hornet, Ruger No. 1B, 26-inch barrel, 1-in-14-inch twist:							
40 Nosler Ballistic Tip	300-MP lot 1	11.7	CCI 450	Winchester	1.934	2,765	1.15
	300 MP lot 2	11.7				2,743	1.12
.25-20 WCF Savage 23B, 24-inch barrel, 1-in-14-inch twist:							
60 Hornady FN	IMR-4227 lot 1	12.0	CCI 400	Winchester	1.569	2,079	2.69*
	IMR-4227 lot 2	12.0				2,025	2.69*
.257 Roberts Remington 722, 24-inch barrel, 1-in-10-inch twist:							
100 Nosler Ballistic Tip	IMR-4350	45.0	CCI 200	Winchester	2.832	3,083	1.35
	A-4350	45.0				2,917	1.88
	H-4350	45.0				2,980	1.12
	IMR-4451 lot 1	46.0				3,052	1.49
	IMR-4451 lot 2	46.0				3,104	1.03
.270 Winchester Model 70 Classic, 22-inch barrel, 1-in-10-inch twist:							
130 Hornady Spire Point	H-4831SC	61.0	WLR	Winchester	3.345	3,029	1.26
	H-4831 original	61.0				3,118	.97
130 Nosler Ballistic Tip	Magnum lot 1	65.0			3.342	3,015	.98
	Magnum lot 2	65.0				3,042	.87
150 Sierra GameKing	MRP	57.5			3.376	2,926	1.02
	RL-22	57.5				2,942	.99
150 Hornady Spire Point	IMR-7977 lot 1	60.0			3.345	2,816	1.65
	IMR-7977 lot 2	60.0				2,813	1.00
.338 Winchester Magnum custom FN Mauser, 22-inch barrel, 1-in-10-inch twist:							
200 Nosler Ballistic Tip	RL-15	67.0	Federal 215	Winchester	3.316	2,933	.93
	N-203B	67.0				2,911	.93

***** All 10 shots in 2.69 inches.
Notes: Group size is the average of five shots.

Be Alert – Publisher cannot accept responsibility for errors in published load data.

Different Batches, "Same" Powder

Some comments are in order on the test results. A 3 percent difference in burn rate amounts to about a 90 fps difference in velocity, with the same powder charge in rifle cartridges with about a 3,000 fps muzzle velocity. Anything less than that amounts to "not much," a technical term often used even by ballistic lab technicians. In fact, with the typical chronographs used by most handloaders, with relatively short distances between the sensors, we'll often see the same load differ in average muzzle velocity as much as 50 fps in two different strings shot during the same range session.

The unopened can of old H-4831 (right) performed very similarly to the powder John used in the 1970s, despite the warning (inset) on the cardboard canister.

Also, powders can act a little differently in different cartridges. Just because two batches of powder differ by 75 fps in one load in one cartridge doesn't mean the difference won't be more or less in another round. All handloading data specifically applies to a certain rifle on a certain day, not all other rifles and cartridges, the reason we use it as a guideline, not an absolute.

Some other Alliant Reloader and Norma powders could have been tested, but simply comparing the loading data for each indicated they were ***not*** the same powder. A good example is Alliant Reloader

19 and Norma 204, which according to the list published on the Internet are exactly the same powder. While data shot in different laboratories varies somewhat, Alliant's data for RL-19 and Norma data for 204 are so different I didn't even bother to comparison-shoot those powders.

However, it looks like Alliant RL-15 and Norma 203B just might be the same powder, or at least close cousins. I've been using the .338 Winchester Magnum load listed in the accompanying table for many years now, and when I substituted Norma 203B, even the group size was identical! Reloder 22 and MRP also appear to be close to the same stuff, but RL-7 and Norma 200 aren't – or at least my two lots aren't.

Along with chronograph tests, the physical appearance of the powders was also compared. My particular lots of Alliant Reloder 22 and Norma MRP looked exactly the same, but a friend has batches that look slightly different. This apparently isn't uncommon. The two batches of IMR-4227 were very similar in grain size, but the new batch purchased early in 2015 was definitely duller in finish.

Comparing the two lots of IMR-4451 proved interesting. The "test platform" was the Remington 722 .257 Roberts inherited from my grandmother. One lot was definitely a little warmer than the other, and accuracy was better with the warmer lot. This agrees with my long experience with the .257 Roberts. In general, so-called +P data results in better accuracy. I suspect this is because "standard" .257 Roberts data is so wimpy that modern powders don't reach the pressure level where they're designed to burn most consistently. In loading for at least a dozen .257s, usually +P loads – or loads even exceeding +P by a grain or so – usually shoot smaller groups. (Nobody really knows why the SAAMI pressure level for the .257 Roberts is so low. Even the +P data is only limited to

Different Batches, "Same" Powder

58,000 psi, even lower than for the .30-06, a much older round.)

I also ended up with three 4350 powders so decided to see how they differed in the .257 Roberts. The 45.0-grain charge with 100-grain bullets is not +P, though it exceeds by half a grain the maximum load listed for Accurate 4350, which is *really* wimpy. My guess is adding another grain or two would result in better accuracy.

With one exception, the .25-20/IMR-4227 test, the groups are all five shots, partly because five is a much better indication of potential accuracy than the typical three-shot groups fired these days, and partly because five shots also provides a much better indication of average velocity. (Usually three-shot groups end up about two-thirds the size of five-shot groups, and no, this is not normally caused by "fliers" due to the barrel heating up but the laws of chance. The fact is, three shots don't provide any idea of the real accuracy potential of a load.) The brass was all either new or once-fired, and like the primers all came from the same lot.

The shooting took place during two range sessions, the first under some relatively windy conditions with a gusty breeze varying from 3 to 10 mph, more than I normally choose to shoot in during accuracy testing. But the primary focus was velocity, not accuracy, and it was springtime in Montana, when we can't always pick ideal range conditions. Some of the groups were no doubt affected by the breeze, the .25-20 groups most of all, with the 10 shots stringing out horizontally but only spreading about 1.5 inches vertically. The .17 Hornet did extremely well in the wind, which many shooters wouldn't expect, but the ballistic truth is that ballistic coefficient and velocity are the only factors in wind drift, not bullet weight.

The most interesting result from all the shooting to me was old H-4831 compared to new H-4831SC. This particular batch of the old powder was definitely warmer, contrary to the tribal knowledge (still passed down by older handloaders and even some younger ones) that "new" H-4831 is hotter than the old military stuff. The old H-4831 may have dried out a little over the years in its cardboard canister but performed very much like the same powder I shot

Above left, using a CZ 527 .17 Hornet, three different lots of Accurate 1680 were extremely close in performance, but contrary to rumor, Reloder 7 didn't prove to be the same as Norma 200, with velocity differing around 4.5 percent. Right, results with the same load of Reloder 15 and Norma 203B were so close, groups were even exactly the same size.

throughout the 1970s and even the 1980s, thanks to an older handloader giving me a few pounds when he quit hunting big game.

Some handloaders will take exception to my exceeding the revered "Jack O'Connor maximum" of 60.0 grains of H-4831 with a 130-grain bullet in the .270 Winchester. However, O'Connor worked up to 62.0 grains with no problems with the military-surplus powder before there was pressure-tested data, but he reduced the load to 60.0 when writing about it. Hornady's present 9th edition *Handbook of Cartridge Reloading* lists 62.0 grains of H-4831 as maximum with any of its 130-grain bullets.

The results indicate that today's powder manufacturers do a very good job of producing different lots of powder that perform similarly to other lots. Since the Magic .223 Powder experience, I still test-shoot any new lot of powder to see how it compares to an older lot but so far have never experienced any difference nearly as dramatic—and hope not to! •

Charles E. Petty

Some years ago I spent some time shooting with J.D. Jones's .300 Whisper wildcat. He took a small cartridge – the .221 Fireball – blew it out to .30 caliber and, using heavy bullets, turned it into an accurate round that did some neat stuff.

Whisper to Blackout

.300 Blackout Loads for a Bolt Rifle

The problem, of course, is that the Whisper cartridges are wildcats, and while there's absolutely nothing wrong with them, the average shooter wants a gun and cartridge that he can buy off the shelf without resorting to custom guns and handloaded ammunition. So, in 2011 the Whisper was reborn as Advanced Armament Corporation's .300 AAC Blackout and introduced as a SAAMI standard cartridge by Remington.

There often is neither rhyme nor reason for the naming of cartridges, and more than a few have asked how it came to be called Blackout. The last time that word was a common part of the vocabulary was during World War II when cities turned off the lights to foil enemy attack.

The .300 Whisper was originally found in single-shot handguns and AR-15 rifles, so it is not entirely surprising that the Blackout appeared in a host of AR-15 type carbines. The rifle's semiautomatic action does place some restrictions on what the cartridge has to do for the rifle to function, so it was a very pleasant surprise to learn that Remington was once using it in the Model 700 LTR (Light Tactical Rifle), now discontinued.

Even though the rifle has a 16-inch barrel, the 0.85-inch diameter at the muzzle would qualify as "heavy" to most, and when topped with a Meopta ZD 4-16x Tactical scope I had on loan, the rifle weighed an even

10 pounds. I quickly came to view that as a blessing in disguise, because the combination of a small cartridge and moderate weight results in minimal recoil even with top loads and heavy bullets. Not to mention that the bolt action opens a whole new world of bullet choices for reloaders, because there is no worry about enough energy to work the action.

The scope has adjustment clicks graduated in the metric system of 0.5 cm at 100 meters, which converts to 0.2 inch at 109 yards, which is between ¼- and ⅛-minute click value. Practically speaking, it was not a problem, although it might be a good idea to tape a small conversion chart to the scope for field use.

Trying to work with a specific cartridge during the current Ice Age of ammunition and component availability would have been impossible had I not already been a fan of the Whisper and had everything needed to get started. My original Whisper ammunition was made from .221 Fireball brass, either by fireforming in the Whisper chamber or by using expanding dies. Fireforming was done in a Contender barrel using a charge of 5.0 grains of Bullseye and then filling the case up to the neck with Cream of Wheat topped by a plug of toilet paper.

The Remington .300 AAC Blackout was fitted with a Meopta 4x16 Tactical scope. The Remington's muzzle is threaded to accept a suppressor.

Normally groups are shot first with factory loads as a basis for comparison, but that wasn't possible. I was able to score one box of Remington .300 Blackout ammunition with a 220-grain bullet and had some old Cor-Bon Whisper

For comparison (left to right): .221 Remington Fireball, .300 AAC Blackout and .223 Remington.

Whisper to Blackout

Table I **.300 Blackout Supersonic Loads**

bullet (*grains*)	powder	charge (*grains*)	velocity (*fps*)	velocity spread (*fps*)	accuracy (*inches*)
125 Nosler Ballistic Tip	H-110	18.0	2,156	65	1.01
	Lil'Gun	16.0	1,846	46	0.74
135 Sierra Match	H-110	17.8	2,136	43	0.85
	Lil'Gun	15.5	2,026	28	0.56
150 Nosler Ballistic Tip	H-110	17.0	2,015	42	1.25
	Lil'Gun	15.0	1,955	32	0.91
155 Sierra Match	H-110	17.0	1,995	33	0.88
	Lil'Gun	14.5	1,877	26	0.93
168 Sierra Match	H-110	15.0	1,788	56	0.59
	Lil'Gun	14.0	1,810	12	0.49

Notes: All loads were shot with a Remington LTR rifle. Velocity readings are five-shot strings at 12 feet. Accuracy results are five-shot groups at 100 yards.

Be Alert – Publisher cannot accept responsibility for errors in published load data.

ammunition with 125-, 150- and 220-grain bullets, but they were only used for velocity reference. Factory loads then available focused on either light or heavy bullets, leaving quite a bit of unexplored territory to visit.

With the current shortage of components, Blackout shooters are making cases by cutting down 5.56 or .223 Remington brass. Sizing can be done in standard dies and then the cases trimmed to length and chamfered. A word of warning here: GI brass is almost always heavier than the commercial stuff, and that means it has a smaller powder capacity. The old advice of reducing charges a bit is still valid. My thought is that published starting loads will be fine, but work up slowly from there.

With the knowledge that the only difference between the Whisper and Blackout is the name, I was able to round up quite a bit of loading data with Internet searches. Most of those were meant for AR-type rifles, and since I didn't have to worry about making the gun function, I was free to use any .30-caliber bullet and, since I had no desire to set new speed records, was able to cautiously infer or deduce loads for most of the weights I wanted to try.

Load development for the bolt-action rifle included bullets from 110 up to 220 grains and velocities from 2,400 fps down to less than 900. The research was divided into supersonic and subsonic loads with the basic goal of finding the best accuracy combinations for each. Since some of my re-formed

Fireball brass was a bit long in the tooth, it was trimmed to 1.360 inches with an RCBS Trim Pro power case trimmer.

Because I simply couldn't find enough factory ammunition to establish any sort of baseline, the best I could do was to look at catalog data and try to come close with velocities. I also dug up data from a long-ago Whisper story and started there, and once I got going with some loads using light bullets, I gradually expanded the search. Earlier work had used a good bit of H-110, and I found some more recent data with Lil'Gun. That turned out to be a great choice.

Experience has taught me that neck sizing is a good thing in bolt guns, so I ordered a set of Redding dies for both full-length and neck sizing, and loading was done using re-formed Fireball cases that were fired in the Remington and then neck sized. Federal Match primers were used.

The Remington's muzzle was thoughtfully threaded, and I happened to have a surpressor. While factory loads are limited to 110- to 115-grain or 204- to 220-grain bullets, I wanted to see how some of the other weights would work, especially the common *match* weights of 168 and 175 grains. Obviously the two classes of ammunition need vastly different scope adjustments, so I began with

Left, old brass was trimmed on an RCBS Tri-Pro trimmer using its clever three-way cutter that also chamfers and deburrs the case. Right, all loads were assembled on a Redding turret press.

Whisper to Blackout

the faster loads, and the work progressed without event. With subsonic loads things got complicated. My normal practice is to chronograph a bunch of handloads then shoot groups with those that show promise, but when I moved to the 100-yard range, I simply ran out of elevation adjustment.

While I could easily get decent hits using the mil dots in the Meopta scope, that really isn't precise enough for shooting groups. So the next step was to order a long-range base that gave an extra 15 MOA elevation. To my surprise, that wasn't quite enough either.

This is really one of those situations that happens when one ventures outside the box. My range is limited to 300 yards, and those powder-puff Trail Boss loads I like so much have never challenged a scope's elevation range, but a ballistics program indicated my subsonic loads for the Blackout were blazing along at 800 to 900 fps and would probably break new ground for parabolic trajectories. The scope would have to be shimmed.

In the meantime, preliminary testing suggested that H-110 (or W-296) and Lil'Gun did well in the Blackout, so I embarked on load development for both supersonic and subsonic velocities. Bullet choices were really dictated by the speeds I wanted, so the supersonic loads used weights of 125 to 168 grains, and the subsonics used 168- to 220-grain bullets.

That wasn't an entirely arbitrary choice, because the first few subsonic loads with lighter bullets wouldn't hit the proverbial barn. After firing a few shots and finding no bullet holes on the paper, I finally spotted a single oblong hole at the bottom of the target. The meandering velocities simply were not enough to stabilize the short,

Table II

.300 Blackout Subsonic Loads

bullet (*grains*)	powder	charge (*grains*)	velocity (*fps*)	velocity spread (*fps*)	accuracy (*inches*)
165 Cutting Edge	H-110	9.0	1,066	34	1.36
	Lil'Gun	8.0	1,044	40	0.90
168 Sierra Match	H-110	9.0	1,028	64	1.16
	Lil'Gun	8.0	1,059	56	1.02
175 Sierra Match	H-110	9.0	1,034	100	1.03
	Lil'Gun	8.0	1,070	52	1.02
175 Berger OTM	H-110	8.5	1,021	55	0.45
		9.0	1,065	76	0.84
	Lil'Gun	7.5	1,034	76	0.75
190 Sierra Match	H-110	8.5	1,049	58	0.83
	Lil'Gun	7.5	1,018	31	1.62
		8.0	1,131	44	1.09
200 Sierra Match	H-110	8.5	954	85	1.61
	Lil'Gun	7.5	914	70	1.21

Notes: All loads were shot with a Remington LTR rifle. Velocity readings are five-shot strings at 12 feet. Accuracy results are five-shot groups at 100 yards.

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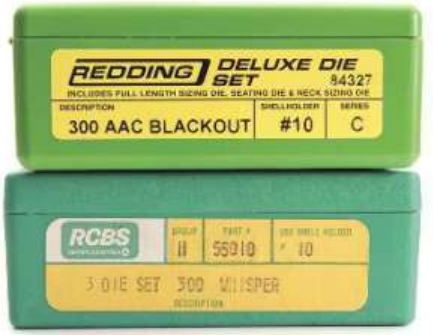
light bullets, even with the rifle's one-in-7-inch twist.

Even though I had a 100-yard zero, I didn't solve the scope issue. To raise point of impact, shims were added to the mount. Having only done this once or twice in the distant past, I decided to make shims of 0.005, 0.010 and 0.015 inch and started with the 0.010 inch but took the others, plus everything needed to make more, to the range.



Redding AAC Blackout and RCBS Whisper dies were interchangeable.

The Meopta was left with the elevation cranked all the way up, so I counted how many clicks it took to reach the bottom – 266 – then brought it back up halfway for a starting point. With a 0.010-inch shim installed, I checked it with the bore sighter and made a very small adjustment. At the range, the very first shot was a couple of inches high of point of aim. Don't you just love it when something turns out the way you want? When the scope was returned, it was replaced with a Leupold 16x Mk IV. ●

Bullets & Brass

(Continued from page 12)

work up to a maximum charge of 54.5 to not over 55.0 grains for 2,850 fps.

Regarding data with the Barnes 140-grain TTSX bullet, start with 54.0 grains of IMR-4831 and work up to a maximum charge of 58.0 grains, which should yield over 3,000 fps. Another option is to start with 54.0 grains of Alliant RL-22 and work up to a maximum charge of 59.5 grains for almost the same velocity.

I hope you have a successful elk season.

.50 Action Express

Q: Ammunition for many of the calibers that I shoot are not available anywhere. For this reason, I took up handloading about two years ago. I have been having so much fun and have learned so much that I wish I would have taken it up 20 years ago. And I look forward to each issue of *Handloader* magazine and consider it the only magazine that provides truly useful information for handloaders.

Hodgdon H-110 powder is a good choice for duplicating factory loads in the .50 Action Express.

I do have a question that I hope you can help me with. I have a Desert Eagle .50 Action Express and have had a difficult time getting good data. I found some using Alliant Unique, but most of the rounds won't cycle reliably. They chamber correctly, but when fired there doesn't seem to be enough recoil to open the action and eject the empty case or feed a new one. Can you suggest a load for the Speer 325-grain hollowpoint bullet that will function correctly? Thanks.

– B.H., via e-mail

A: *It sounds like your load is failing to function due to a powder that is burning too fast and is not producing enough gas energy to reliably cycle the action. To duplicate the velocity and pressures from Speer factory loads, I suggest using 32.0 to not over 33.0 grains of Hodgdon H-110 powder with the Speer 325-grain plated HP bullet and cap it with a CCI 350 Large Pistol Magnum primer. This will reach around 1,425 to 1,450 fps, should function reliably in your pistol and is within industry pressure guidelines that are currently established at 35,000 psi.* ●

(Continued from page 9)

many years ago, "Guns I Should Have Kept."

In retrospect, the S&W .44 Target may have been the most accurate handgun I have ever used, although the Patridge/Call Gold Bead front sight was a bit too wide for my liking, or the rear notch was a bit to narrow, take your pick. For arget shooting it was fine when there was plenty of time to acquire a perfect sight picture, but for hunting, the sights were a bit too confined.

The Colt SAA .44 Special was used for handgun silhouette competition for a couple of years, where it was openly condemned by many as an obsolete cowboy gun by the boys with the big guns, mostly Dan Wessons, S&Ws and Rugers, that were so popular at the time. It seemed to take forever for the .44 Special slug to arc out over 200 yards, but the distinct "clunk" when that cast bullet plunked steel was worth more than words can express in terms of "stuffing it" to the ever-present critics. In mixed company, accuracy with the Colt .44 was explained simply as, "If you toss enough lead in the air, sooner or later you will hit something."

I'm somewhat humbled to have crossed paths with Elmer Keith, who signed two of his books for my birthday in 1979, and Bill Jordan, who dazzled me with his quickness and accuracy on the TV show "You Asked for It" nearly 60 years ago. Which is not to ignore all the fine writers who have contributed to the magazines over the years. I never met Skeeter, albeit I did meet his friend Evan Quiros, the owner of the Shipp Ranch that Skelton mentioned so often in his writing.

I was standing to the side of a crowded aisle at a trade show when I spotted Bart Skelton (Skeeter's son) and waited until he approached to say hello. Another man with Bart was wearing a name tag, Evan Quiros, who walked up, looked me straight in the eye and said, "I have a rifle with your name on it." In the noise of the crowded aisle, I sort of mistook what he said as that he had a bullet with my name on it, or some such, and was a bit startled. I must have had a pretty blank look on my face, as he extended his right hand, repeating "I have a rifle with your name on it." I quipped back, "It's a pleasure to meet you, what name is that?" – not thinking about the wildcat(s) that Bob Fulton (Hawk Bullets) and I developed a number of years ago. I managed to ask how he came by it, which he explained was a gift from a friend. The crowd closed in, and Evan and Bart departed as quickly as they had arrived, leaving me a bit stunned and thinking *holy cow*, Evan Quiros, who in some measure served as Skeeter's fictional friend Dobe Grant in so many great stories, has one of my wildcats on the Shipp Ranch. You can't make this up.

Fortunately, PJS, then-publisher of ST, saw fit to reprint many, if not most, of Skelton's work in two books and one paperback magazine-sized publication, *Good Friends, Good Guns, Good Whiskey* (1988); *Hoglegs, Hipshots and Jalapeños* (1991); and *Skeeter Skelton on Handguns* (1980), respectively. Sally Jim's book, *I Remember Skeeter* (1997), which represents an artful undertaking by a wonderful lady, was long ago sold out, but it and the others might be found on Amazon or whatever out-of-print book outlets. •

In Range

(Continued from page 70)

vestment. You can tell almost at a glance if it has been abused, but since each operation is done by hand, one stroke at a time, it takes some pretty serious maltreatment to render such a machine unusable. Buy it, fasten it to a sheet of scrap plywood, and when the time comes, simply clamp it to your bench. When not in use, it can be stuck in a corner, out of the way.

Before the Lee Loader, the hand-tool universe was ruled by the Lyman 310 "tong tool," a device that resembled a hefty pliers with a die attached. The Lee, vastly simpler and cheaper, displaced the Lyman.

Through the 1960s and 1970s, the Lee Loader was regarded as the tool of the beginner or once-a-year deer hunter. Since it neck-sized only, it was pretty basic. Each implement could be turned on a lathe, and it came with a small powder scoop. A chart was included showing the appropriate powder for that scoop, using different bullet weights. The shotshell kits were a little more elaborate and included shot scoops as well.

Lee Loaders got a boost from an unexpected quarter as benchrest shooting gained popularity. The most serious target shooters realized they could get better accuracy by neck-sizing only – and still better using the same case and reloading after each shot. You could take your Lee Loader to the range and do all the operations right there, throughout the match.

Lee responded with a more elaborate target model, which included an inside neck reaming tool, primer pocket reamer and a few other goodies. These kits were about twice the price of the standard – $20 versus $10 – but they worked extremely well. More than one benchrest match was won by a shooter using a Lee tool to produce super-precise ammunition.

Through the same period, shotshell reloading went a completely

Although Texan is long-since out of business, used machines can be found on eBay, various loading websites or for sale at gun clubs. They usually cost only a few bucks.

different direction. With no shotshell equivalent of benchrest, the Lee Loader fell into disfavor as the emphasis was placed on speed and quantity. Where a benchrest shooter might fire 5 or 10 precise shots, a trap shooter would burn through 500.

At one time, I owned three Lee Loaders (target model in .300 Weatherby Magnum and .222 Remington Magnum and standard in .30-06), and even went so far as to buy the complete set of scoops to allow maximum flexibility in powder charges. They all disappeared somewhere along the line, but so did the rifles they were used for. I never did own a shotshell kit.

A quick look on eBay, where you can buy practically anything, showed exactly one (1) shotshell kit for sale, in 20 gauge, and it sold for $46.50 – almost five times its original price, and there were a dozen guys bidding on it. Two days later, there were two dozen kits listed, for various gauges and calibers. When something obscure sells for good money, suddenly a bunch appear out of the woodwork.

For benchrest shooters, a selection of specialized, portable tools replaced the Lee Loader. Shotshell loaders, however, were out of luck after Lee ceased production of the handy gadget around 1988. Since the low price of target shotshells is having an impact even on high-capacity reloading, there is minimal demand for a hand tool. The number of experimenters in shotshell loads is limited.

Looking around, though, I found a couple of small manufacturers listed online. One is Lane's Reloading in Michigan (www.lanesreloading.com) and another is Paco Kelly in Arizona (www.pacotools.com). These are shotshell loaders only; Lane offers gauges from 10 to .410, while Kelly makes only 28 gauge and .410. Both follow the Lee approach, and both are vastly cheaper than buying a new Ponsness-Warren every time you want to try a different load.

There is another interesting aspect to the American market, whether it is for guns, ammunition, loading equipment, sights or anything else. Every time an aging gunshop closes up, all kinds of artifacts surface. This is why, periodically, we see stuff for sale billed "new in the box," yet it has not been manufactured for 50 years.

There are myriad goodies tucked away on store-room shelves collecting dust, waiting to be cleared out. Whatever you're looking for, if you're patient, it's almost certain to come along eventually. •

When Simpler Is *Far* Better

IN RANGE by Terry Wieland

A friend has solved the continuing problem of reloading shotshells in a variety of gauges and charge weights: Every time he wants a new load, he buys another progressive reloading machine (usually a Ponsness-Warren or Hornady 366) and sets it up, permanently adjusted to one load only.

Needless to say, he has a little more space than you or I. His reloading room is the size of a small house, and a dozen loading machines occupy a bench stretching into the distance. Each machine is flanked by bins containing hulls and wads, and the shelves above hold the other components.

This admittedly idiosyncratic behavior might be explained by too much money or not enough patience, but in reality it reflects a healthy realization that shotshell reloading, using modern progressive presses, does not lend itself to either experimentation or small runs of specialty loads.

Anyone who has ever converted a big progressive from a load using one hull and wad combination to another knows the difficulties involved. In fact, many loading manuals, and even the machine's instructions, caution against attempting to adjust certain settings. Since most machines come from the factory preset for Winchester AA hulls and standard target loads, anyone wanting anything else is condemned to venture into the arcane world of machine adjustments.

Antique single-stage shotshell presses, like this Texan 20 gauge, are useful for experimental loads and small runs of specialty loads.

Like modern CNC machines, progressive tools are designed to produce large quantities of one load quickly. For a trap shooter who goes through several hundred rounds in a day, and sticks with just one load, this is great. For the multigun man, who hunts, shoots targets, occasionally spends time at a patterning board and likes to tinker with wad and shot combinations, it's a recipe for madness.

Years ago, many shooters who reloaded shotshells could date their education to an early experience with the Lee Loader, a system so basic it almost defies belief. Every single operation is performed by hand, using the simplest of tools. In fact, anyone with an eye to history can trace the ancestry of the Lee Loader to the capping and decapping tools, wad seaters and crimping tools used in the 1800s to load black-powder cartridges, one at a time. Even those were more complicated than the Lee Loader, the basic operation of which is provided by a mallet.

Those of us who grew up with Lee Loaders spent much of our tedious loading time wishing for something faster. I know I did. Only now, using a Hornady or Ponsness-Warren, do I really appreciate the virtues of simplicity when it comes to producing small lots of specialty cartridges.

Of course, you don't have to resort to a Lee Loader to get simplicity, which is fortunate, because they are no longer made for shotshells. In between lie the simpler MEC machines, and there are even old ones like the Texan that can be put to use. These are found on eBay or on the "take it, cheap" counter in gun clubs. At $50 or $60, such a machine is a good in-

(Continued on page 68)

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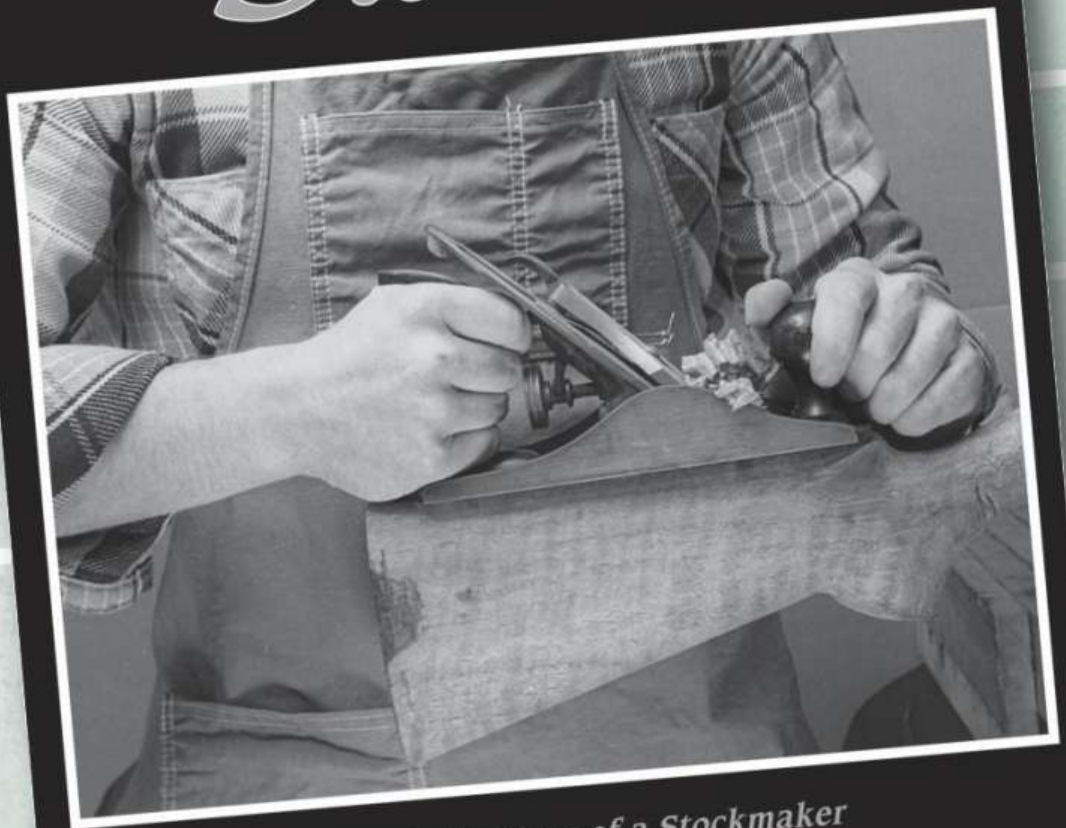

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